U.S. Department of the Interior

Bureau of Land Management
Rawlins Field Office

January 2002

Environmental Assessment for the Hanna Draw Coalbed Methane Exploration Project, Carbon County, Wyoming

MISSION STATEMENT

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

WY-030-EA1-171

BLM/WY/PL-02/005+1310

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Rawlins Field Office
P.O. Box 2407 (1300 North Third Street)
Rawlins, Wyoming 82301-2407

In Reply Refer To:
1790

JAN 16 2002

Re: Hanna Draw Coalbed Methane (CBM)
Exploration Project

Dear Reader:

Enclosed for your review and comment is the Environmental Assessment (EA) for Williams Production RMT Company's (formerly Barrett Resources), Hanna Draw Coalbed Methane Exploration Project. In order to satisfy the requirements of the National Environmental Policy Act, the EA was prepared to analyze impacts associated with the exploration of coalbed methane resources north of the Town of Hanna in Carbon County, Wyoming.

Analysis of the environmental consequences has led to the determination that this proposed project, with the appropriate mitigating measures, will not have a significant effect on the human environment. Therefore, an Environmental Impact Statement will not be required. Pending the results of a public review of this document, the Bureau of Land Management (BLM) will prepare a formal Decision Record.

Your comments should be as specific as possible. Comments on the alternatives presented and on the adequacy of the impact analysis will be accepted by BLM until February 19, 2002.

Comments may be submitted via regular mail to:

Brenda Vosika Neuman, Project Manager
Bureau of Land Management
Rawlins Field Office
P.O. Box 2407
1300 North Third Street
Rawlins, Wyoming 82301

In the past, we have allowed comments to be submitted via electronic mail. However, at this time, we are unable to receive e-mail and are uncertain when it may become available. To ensure that your comments are considered, we asked that you do not send responses to the Hanna Draw CBM Exploration Project EA electronically.

Please note that comments, including names, e-mail addresses, and street addresses of the respondents, will be available for public review and disclosure at the above address during regular business hours (7:45 a.m. to 4:30 p.m.), Monday through Friday, except holidays. Individual respondents may request confidentially. If you wish to withhold your name, e-mail

address, or street address from public review or from disclosure under the Freedom of Information Act, you must state this plainly at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

Please retain this EA for future reference. A copy of the EA has been sent to affected government agencies and to those who responded to scoping or otherwise indicated that they wished to receive a copy of the EA. The EA may also be reviewed at the following locations:

Bureau of Land Management
Wyoming State Office
5353 Yellowstone Road
Cheyenne, Wyoming 82009

Bureau of Land Management
Rawlins District Office
1300 N. Third Street
Rawlins, Wyoming 82301

If you require additional information regarding this project, please contact Brenda Vosika Neuman at the above address or phone (307) 328-4389.

Sincerely,

Field Manager

Enclosure

ENVIRONMENTAL ASSESSMENT FOR THE HANNA DRAW COALBED METHANE EXPLORATION PROJECT, CARBON COUNTY, WYOMING

Prepared for

Bureau of Land Management
Rawlins Field Office
Rawlins, Wyoming

This Environmental Analysis was prepared by TRC Mariah Associates Inc., an environmental consulting firm, with the guidance, participation, and independent evaluation of the Bureau of Land Management (BLM). The BLM, in accordance with Title 40 Code of Federal Regulations, Part 1506(a) and (b), is in agreement with the findings of the analysis and approves and takes responsibility for the scope and content of this document.

January 2002

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (CONTINUED)

Page

TABLE OF CONTENTS (CONTINUED)

Page

TABLE OF CONTENTS (CONTINUED)

Page

TABLE OF CONTENTS (CONTINUED)

Page

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

ACEC	Area of Critical Environmental Concern
APD	Application for Permit to Drill
AQD	Air Quality Division
ARPA	*Archaeological Resource Protection Act of 1979*
AUM	Animal unit month
BA	Biological Assessment
bbl	42-gal barrel
BLM	U.S. Bureau of Land Management
BO	U.S. Fish and Wildlife Service Biological Opinion
bpd	Barrels per day
C.F.R.	*Code of Federal Regulations*
CBL	Cement bond log
CBM	Coalbed methane
CCRBD	Carbon County Road and Bridge Department
CEQ	Council on Environmental Quality
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
cfs	Cubic feet per second
CGF	Central gathering/metering facility
CIAA	Cumulative impact assessment area
CO	Carbon monoxide
COE	U.S. Army Corps of Engineers
dBA	A-weighted decibel
EA	Environmental assessment
EIS	Environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	*Endangered Species Act*
FLPMA	*Federal Land Policy and Management Act of 1976*
FONSI	Finding of No Significant Impact
frac	Fracture stimulation of well bore
gpm	Gallons per minute
HAP	Hazardous air pollutant
HDEPA	Hanna Draw Exploration Project Area
HDPE	High-density polyethelene
hp	Horsepower
I-80	Interstate 80
LOP	Life-of-project
mcf	Thousand cubic feet
mcfgpd	Thousand cubic feet of gas per day

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

mmcfd	Million cubic feet per day
MSDS	Material Safety Data Sheets
MSHA	Mine Safety and Health Administration
n.d.	No date
NAAQS	National Ambient Air Quality Standards
NCPA	National Cultural Programmatic Agreement
NEPA	*National Environmental Policy Act of 1969*
NHPA	*National Historic Preservation Act*
NO_2	Nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSO	No Surface Occupancy
NTL	Notice to Lessee
O_3	Ozone
ORV	Off-road vehicle
Pb	Lead
pc	Progressive cavity
PM_{10}	Respirable particulates
PMZ	Primary Management Zone
PSD	Prevention of Significant Deterioration
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right-of-way
SARA	*Superfund Amendments and Reauthorization Act of 1986*
SeaWest	SeaWest Windpower, Inc.
SHPO	State Historic Preservation Office
SO_2	Sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SWPPP	Storm Water Pollution Prevention Plan
T&E	Threatened and endangered
TDS	Total dissolved solids
TEP&C	Threatened, endangered, proposed, and candidate
TSP	Total suspended particulates
UPRR	Union Pacific Railroad
U.S.C.	*United States Code*
USDC	U.S. Department of Commerce
USDI	U.S. Department of Interior

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UW	University of Wyoming
VOC	Volatile organic compounds
VRM	Visual Resource Management
WAAQS	Wyoming Ambient Air Quality Standards
WDE	Wyoming Department of Employment
WDEQ	Wyoming Department of Environmental Quality
WDOT	Wyoming Department of Transportation
WGFD	Wyoming Game and Fish Department
Williams	Williams Production RMT Company
WIMS	Wyoming Internet Map Server
WNDD	Wyoming Natural Diversity Database
WOGCC	Wyoming Oil and Gas Conservation Commission
WQD	Water Quality Division
WRCC	Western Regional Climate Center
WSEO	Wyoming State Engineer's Office
WSP	Wyoming State Protocol

1.0 INTRODUCTION

Williams Production RMT Company (Williams) of Denver, Colorado (formerly Barrett Resources Corporation), proposes an exploration coalbed methane (CBM) project located in Townships 23 and 24 North, Ranges 80 and 81 West, Carbon County, Wyoming (Figure 1.1). The Hanna Draw Exploration Project Area (HDEPA) analyzed in this environmental assessment (EA) encompasses approximately 18,151 acres (in the combined exploration drilling area and pipeline corridor), 6,735 acres (37%) of which are federal surface and mineral estate administered by the U.S. Bureau of Land Management (BLM), Rawlins Field Office. The exploration area outlined on Figure 1.1 lies within the Hanna Draw Federal Unit, a BLM-designated leasing unit currently leased by Williams. Only the exploration area and a proposed interconnect pipeline corridor (Figure 1.2) are evaluated as "the project area" or "the HDEPA" in this EA. Where necessary, the exploration area (as depicted on Figure 1.1) is discussed separately from the interconnect pipeline (Figure 1.2).

The area in which exploration wells would be drilled occupies 5,680 acres, 2,640 acres (46%) of which is federal surface. Up to 16 new wells would be drilled for this exploration project, seven on private land and nine on BLM land. Nine wells on private land have already been drilled and completed, so the exploration project would consist of a total of 25 wells. Twenty-three possible new well locations are shown on Figure 1.1, but no more than 16 additional new wells would be drilled. Seven contingency locations are identified to enable Williams flexibility on where to drill the exploration wells. If the exploration field is economically productive, Williams proposes to construct, operate, and maintain the necessary production facilities, including a natural gas interconnect pipeline to connect to an existing interstate pipeline (Figure 1.2). The exact pipeline alignment is not yet known, although it would be constructed within the 1-mi wide corridor shown on Figure 1.2. The entire 1-mi wide corridor encompassing an area of 12,471 acres (4,095 acres [33%] of which is federal surface) was analyzed in this EA (Figure 1.2). However, only a 90-ft construction right-of-way (ROW) and a 50-ft permanent (operations) ROW would be required for the pipeline.

Figure 1.1 Project Location.

Figure 1.2 Proposed Pipeline Corridor and Landownership.

The primary objectives for the exploration project would be:

- to determine the economically productive coal seams,
- to identify economical drilling and completion techniques,
- to determine if coal dewatering can be achieved,
- to assess produced water quality and quantity, and
- to identify the preferred depths/pressure windows for economic gas production.

1.1 PURPOSE AND NEED

The purpose of the proposed project is to determine the commercial feasibility of producing federally owned CBM gas by a private company pursuant to their rights under existing oil and gas leases issued by the BLM and to prevent drainage of federal minerals by wells adjacent to nonfederal lands. National mineral leasing policies and the regulations by which they are enforced recognize the statutory right of lease holders to develop federal mineral resources to meet continuing national needs and economic demands so long as undue and unnecessary environmental degradation is not incurred. Privately owned gas would likely be developed regardless of development on federal lands.

Natural gas is an integral part of the U.S. energy future due to its availability, the presence of an existing market delivery infrastructure, and the environmental advantages of clean-burning natural gas as compared with other fuels. In addition, the development of abundant domestic reserves of natural gas would reduce the country's dependence on foreign sources of energy and maintain an adequate and stable supply of fuel for economic well-being, industrial production, power generation, and national security. The environmental advantages of natural gas combustion versus other conventional fuels are emphasized in the *Clean Air Act* amendments of 1990.

1.2 CONFORMANCE AND AUTHORIZING ACTIONS

This EA is prepared in accordance with the *National Environmental Policy Act of 1969* (NEPA), as amended, and is in compliance with all applicable regulations and laws passed subsequently,

including Council on Environmental Quality (CEQ) regulations (40 *Code of Federal Regulations* [C.F.R.] 1500-1508), U.S. Department of Interior (USDI) requirements (*Department Manual 516, Environmental Quality* [USDI 1980]), guidelines listed in the BLM *NEPA Handbook, H-1790-1* (BLM 1988a), and *Guidelines for Assessing and Documenting Cumulative Impacts* (BLM 1994). This EA assesses the environmental impacts of the Proposed Action (Section 2.1) and No Action Alternative (Section 2.2) and serves to guide the decision-making process.

The Great Divide Resource Area Record of Decision (ROD) and approved Resource Management Plan (RMP) (BLM 1987, 1988b, 1990a) directs the management of BLM-administered lands within the HDEPA. The objective for management of oil and gas resources is to provide for leasing, exploration, and development of oil and gas while protecting other resource values. Development of CBM within the HDEPA is in conformance with the RMP. If this exploration project proves viable and additional CBM development beyond that described herein is proposed, BLM would then require further NEPA analysis for these additional proposals.

The exploration area is completely within the MetFuel Hanna Basin CBM Project Area, for which an environmental impact statement (EIS) was prepared by the BLM's Rawlins Field Office (BLM 1993). The NEPA analysis for Williams's proposed exploration project is tiered to the MetFuel EIS and includes existing information and analysis where appropriate. Any information from the MetFuel EIS that is pertinent to this analysis is reproduced in its entirety in this document. BLM has updated information and conducted additional analysis where needed.

The proposed interconnect pipeline crosses the Simpson Ridge windpower project area, for which SeaWest Windpower Inc. holds a ROW to access and construct wind turbine generators and related facilities on BLM-administered lands. The windpower project was evaluated in the KENETECH/PacifiCorp Windpower Project EIS (BLM 1995a, 1995b), and the NEPA analysis presented in this EA is also tiered to the windpower EIS, as appropriate. Any information from the KENETECH/PacifiCorp EIS that is pertinent to this analysis is reproduced in its entirety in this document.

The proposed project is also in conformance with the *State of Wyoming Land Use Plan* (Wyoming State Land Use Commission 1979) and the Carbon County Land Use Plan (Pederson Planning Consultants 1997, 1998) and would comply with all relevant federal, state, and local laws and regulations (Table 1.1).

A tiered approach to environmental review is used by the BLM in the leasing, exploration, and development of mineral resources. Initial environmental review occurs during BLM land use planning, during which appropriate lease stipulations for development are identified with public input. Accordingly, the federal minerals within the exploration area that have been leased to Williams carry a contractual commitment to allow for their development in accordance with the terms and conditions of the respective leases. During exploration, this EA, and site-specific EAs, as necessary, are prepared for each Application for Permit to Drill (APD) and each ROW application for access roads, water and gas gathering lines, pipelines, etc., as these applications are submitted, to ensure that significant impacts to surface and subsurface resource values do not occur. If exploration results in the discovery of economically recoverable quantities of natural gas such that development beyond that described in this EA is proposed, additional NEPA analysis would be required to assess the direct, indirect, and cumulative impacts to the environment that may result from such development.

The BLM has the authority to deny individual APDs and ROW applications; however, the lessee's right to drill and develop somewhere within the leasehold cannot be denied. Pursuant to the *Federal Land Policy and Management Act of 1976* (FLPMA), the BLM also has the authority and responsibility to protect the environment within federal oil and gas leases; therefore, restrictions may be imposed on lease terms. However, mitigation measures that would render a proposed operation uneconomical or unfeasible are not consistent with the lessee's rights and cannot be required unless they are included as a lease stipulation or are necessary to prevent unnecessary and undue degradation of public lands or resources (BLM Instruction Memorandum 92-67).

Table 1.1 Federal, State, and County Permits, Approvals, and Authorizing Actions, Hanna Draw Coalbed Methane Exploration Project, Carbon County, Wyoming, 2001.[1]

Agency	Permit, Approval, or Action	Authority
Bureau of Land Management (BLM)	Permit to drill, deepen, or plug back on BLM-managed land (APD process)	*Mineral Leasing Act of 1920*, as amended (30 U.S.C. 181 et seq.); Requirements for Operating Rights Owners and Operators, as amended (43 C.F.R. 3162)
	ROW grants and temporary use permits for pipelines on BLM-managed land	*Mineral Leasing Act of 1920*, as amended (30 U.S.C. 185); Onshore Oil and Gas Unit Agreements: Unproven Areas, as amended (43 C.F.R. 3180)
	ROW grants for access roads on BLM-managed land	*Federal Land Policy and Management Act* (43 U.S.C. 1761-1771); Right-of-Way, Principles and Procedures, as amended (43 C.F.R. 2800)
	Authorization for flaring and venting of natural gas on BLM-managed land	*Mineral Leasing Act of 1920*, as amended (30 U.S.C. 181 et seq.); Requirements for Operating Rights Owners and Operators, as amended (43 C.F.R. 3162)
	Plugging and abandonment of a well on BLM-managed land	*Mineral Leasing Act of 1920*, as amended (30 U.S.C. 181 et seq.); Requirements for Operating Rights Owners and Operators, as amended (43 C.F.R. 3162)
	Antiquities and cultural resource permits on BLM-managed land	*Antiquities Act of 1906*, as amended (16 U.S.C. 431-433); *Archaeological Resources Protection Act of 1979*, as amended (16 U.S.C. Sections 470aa-470ll); Preservation of American Antiquities, as amended (43 C.F.R. 3)
Carbon County	Construction/use permits	County Code and Zoning Resolution
	Conditional use permits	County Code and Zoning Resolution
	Road use agreements/oversize trip permits	County Code
	County road crossing/access permits	County Code/Engineering Department
	Small wastewater permits	County Health Department
	Hazardous material recordation and storage	County Code
	Zone changes	Zoning Resolution
	Filing fees	County Code
	Noxious weed control	County Code

Table 1.1 (Continued)

Agency	Permit, Approval, or Action	Authority
U.S. Army Corps of Engineers (COE)	Section 404 permits and coordination regarding placement of dredged or fill material in area waters and adjacent wetlands	Section 404 of the *Clean Water Act of 1972*, as amended (33 U.S.C. 1344); EPA-administered Permit Programs: The National Pollutant Discharge Elimination System (NPDES), as amended (40 C.F.R. 122); State Program Requirements (40 C.F.R. 123); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Filled Material, as amended (40 C.F.R. 230)
U.S. Fish and Wildlife Service (USFWS)	Coordination, consultation and impact review on federally listed threatened and endangered (T&E) species	*Fish and Wildlife Coordination Act* (16 U.S.C. 661-666c); Section 7 of the *Endangered Species Act of 1973*, as amended (16 U.S.C. 1536); *Bald Eagle Protection Act* (16 U.S.C. 668-668dd)
	Migratory bird impact coordination	*Migratory Bird Treaty Act* (16 U.S.C. 704)
U.S. Department of Transportation	Control pipeline maintenance and operation	Transportation of Natural and Other Gas by Pipeline; Annual Reports, Incident Reports, and Safety Related Condition Reports, as amended (49 C.F.R. 191); Transportation of Natural and Other Gas by Pipeline: Minimum Safety Standards, as amended (49 C.F.R. 192)
Wyoming Department of Environmental Quality - Water Quality Division (WDEQ-WQD)	Permits to construct settling ponds and waste water systems, including ground water injection and disposal wells	*Wyoming Environmental Quality Act*, Article 3, Water Quality, as amended (W.S. 35-11-301 through 35-11-311)
	Regulate disposal of drilling fluids from abandoned reserve pits	*Wyoming Environmental Quality Act*, Article 3, Water Quality, as amended (W.S. 35-11-301 through 35-11-311)
	NPDES permits for discharging produced water and storm water runoff	WDEQ-WQD Rules and Regulations, Chapter 18; *Wyoming Environmental Quality Act*, Article 3, Water Quality, as amended (W.S. 35-11-301 through 35-11-311); Section 405 of the *Federal Water Pollution Control Act (Clean Water Act)* (codified at 33 U.S.C. 1345); EPA-administered Permit Programs: NPDES, as amended (40 C.F.R. 122); State Program Requirements (40 C.F.R. 123); EPA Water Program Procedures for Decision-making, as amended (40 C.F.R. 124)
	Administrative approval for discharge of hydrostatic test water	*Wyoming Environmental Quality Act*, Article 3, Water Quality, as amended (W.S. 35-11-301 through 35-11-311)
Wyoming Department of Environmental Quality - Air Quality Division (WDEQ-AQD)	Permits to construct and permits to operate	*Clean Air Act*, as amended (42 U.S.C. 7401 et seq.); *Wyoming Environmental Quality Act*, Article 2, Air Quality, as amended (W.S. 35-11-201 through 35-11-212)
Wyoming Department of Environmental Quality - Land Quality Division (WDEQ-LQD)	Mine permits, impoundments, and drill hole plugging on state lands	*Wyoming Environmental Quality Act*, Article 4, Land Quality, as amended (W.S. 35-11-401 through 35-11-437)

Table 1.1 (Continued)

Agency	Permit, Approval, or Action	Authority
Wyoming Department of Environmental Quality - Solid Waste Division (WDEQ-SWD)	Construction fill permits and industrial waste facility permits for solid waste disposal during construction and operations	*Wyoming Environmental Quality Act*, Article 5, Solid Waste Management, as amended (W.S. 35-11-501 through 35-11-520)
Wyoming Department of Transportation (WDOT)	Permits for oversize, overlength, and overweight loads	Chapters 17 and 20 of the Wyoming Highway Department Rules and Regulations
	Access permits to state highways	Chapter 13 of the Wyoming Highway Department Rules and Regulations
Wyoming Oil and Gas Conservation Commission (WOGCC)/Wyoming Board of Land Commissioners/Land and Farm Loan Office	Approval of oil and gas leases, ROWs for long-term or permanent off-lease/off-unit roads and pipelines, temporary use permits, and developments on state lands	Public Utilities, W.S. 37-1-101 et seq.
WOGCC	Permit to drill, deepen, or plug back (APD process)	WOGCC Regulations, Chapter 3, Operational and Drilling Rules, Section 2 Location of Wells
	Permit to use earthen pit (reserve pits)	WOGCC Regulations, Chapter 4, Environmental Rules, Including Underground Injection Control Program Rules for Enhanced Recovery and Disposal Projects, Section 1, Pollution and Surface Damage (Forms 14A and 14B)
	Authorization for flaring or venting of gas	WOGCC Regulations, Chapter 3, Operational and Drilling Rules, Section 45 Authorization for Flaring or Venting of Gas
	Permit for Class II underground injection wells	Underground Injection Control Program: Criteria and Standards, as amended (40 C.F.R. 146); State Underground Injection Control Programs, State-administered program - Class II Wells, as amended (40 C.F.R. 147.2551)
	Well plugging and abandonment	WOGCC Regulations, Chapter 3, Section 14, Reporting (Form 4); Section 15, Plugging of Wells, Stratigraphic Tests, Core, or Other Exploratory Holes (Form 4)
	Change in depletion plans	*Wyoming Oil and Gas Act*, as amended (W.S. 30-5-110)
Wyoming State Engineer's Office (WSEO)	Permits to appropriate ground water (use, storage, wells, dewatering)	W.S. 41-3-901 through 41-3-938, as amended (Form U.W. 5)
Wyoming State Historic Preservation Office (SHPO)	Cultural resource protection, programmatic agreements, consultation	Section 106 of *National Historic Preservation Act of 1966*, as amended (16 U.S.C. 470 et seq.) and Advisory Council Regulations on Protection of Historic and Cultural Properties, as amended (36 C.F.R. 800)

[1] This list is intended to provide an overview of the key regulatory requirements that would govern project implementation. Additional approvals, permits, and authorizing actions may be necessary.

All mineral actions would comply with established goals, objectives, and resource restrictions (mitigations) required to protect natural resource values in the Rawlins Field Office planning area. Resources, impacts, and associated mitigation and monitoring measures on federal, state, and private lands within the HDEPA are addressed in this EA.

Use authorizations for roads, gas and water gathering lines, and well site facilities would be processed through the BLM APD and sundry notice permitting process as long as the facilities remain on-lease and are owned and operated by Williams. Any facility located off-lease, including a 19.5-mi long interconnect pipeline, would require an individual ROW authorization.

Some leases within the exploration area include special stipulations regarding occupancy in addition to standard lease terms. These special stipulations are designed to protect surface resources such as soils, water, and wildlife by restricting periods of activity and areas of disturbance. Application of these lease stipulations will be handled on a case-by-case basis for each APD submitted to the BLM.

1.3 LAND AND RESOURCE MANAGEMENT ISSUES AND CONCERNS

A number of issues was identified during scoping for this project by the BLM and other entities. A scoping notice was sent to approximately 350 government agencies, news outlets, organizations, and individuals in March 2001 to solicit comments on the proposed project. In addition, an open house was held at the Town of Hanna Administrative Office on April 17, 2001, to answer questions regarding the proposed project. Twenty-one written comments were received--eight from individuals, five from environmental organizations, one from a petroleum organization, five from state agencies, and two from federal agencies. Issues identified by respondents and/or by the BLM are listed in Appendix A.

2.0 THE PROPOSED ACTION AND ALTERNATIVES

Two alternatives are evaluated in this EA: 1) the Proposed Action (up to nine wells and associated facilities on approximately 2,640 federal acres and an interconnect pipeline along a corridor encompassing approximately 4,095 federal acres) (Section 2.1); and 2) the No Action Alternative (no further federal land development) (Section 2.2). Under the No Action Alternative, federal land would be used to access some CBM development on private land to the extent that a ROW has been issued to Williams to utilize the existing MetFuel road and a road south of the exploration area (Figure 1.1), both of which cross federal land. However, the No Action Alternative would preclude any further federal action, as presented in this document. If the No Action Alternative is selected, Williams may proceed with their project on private land but separate ROWs or sundry notices would be required for action on federal land and a separate NEPA analysis would be completed. The pipeline would not be authorized at this time. Additional alternatives were considered but rejected and these are discussed in Section 2.3.

2.1 THE PROPOSED ACTION

Williams proposes an exploration CBM project located in Townships 23 and 24 North, Ranges 80 and 81 West, Carbon County, Wyoming, approximately 10 mi northeast of Hanna (Figures 1.1 and 1.2). The Proposed Action would involve the development of up to nine wells and associated facilities on federal land and a ROW to construct and operate the interconnect pipeline on federal land. Access is from Hanna along Carbon County Road 291 (Hanna Draw Road). The HDEPA encompasses approximately 18,151 acres, 6,735 acres (37%) of which are federal surface and mineral estate. The exploration project would consist of drilling, casing, completing, and producing up to 16 CBM wells on private land and up to nine wells on federal land administered by the BLM. The 16 wells on private land have been approved and permitted by the Wyoming Oil and Gas Conservation Commission (WOGCC), and access has been authorized by the BLM. Development of the nine wells on federal land would begin in the fourth quarter of 2001. All wells would be located to minimize potentially adverse environmental impacts. Production wells would be spaced at 80 acres or eight wells per 640-acre section.

Ancillary facilities would include access roads, gas and water gathering lines, a power source, a central gathering/metering facility (CGF), a reservoir, and, if the field proves economically viable, a compressor station and the interconnect pipeline. No power lines are currently proposed.

All produced water would be contained in the existing reservoir, and no uncontained surface water discharge is proposed at this time (see Water Management Plan, Appendix B). The Wyoming State Engineer's Office (WSEO) has issued Reservoir Permit No. 11084R to appropriate surface water. In addition, Williams has applied for a National Pollutant Discharge Elimination System (NPDES) permit to discharge produced water from the Wyoming Department of Environmental Quality (WDEQ) (the draft NPDES permit is included in Appendix C). Produced water quality would be monitored in accordance with state and federal regulations.

Two existing improved roads provide the primary access to the field. Field development of 25 wells would require the construction/reconstruction of a maximum of 6.5 mi of access roads with adjacent gas and produced water gathering lines (facilities corridors). An estimated 2.75 mi of new road would be built on federal land and 3.75 mi of road/facilities corridors would be built on private land. Approximately 1.5 mi (not included in the total of 6.5 mi of road construction/reconstruction) of existing undeveloped road have already been upgraded.

Each well would require gas and water gathering lines (gas lines to collect CBM from wells and to transport it to a centralized pod to be located on private land and water lines to transport produced water to a reservoir for containment and evaporation) and a power source. Natural gas gathering lines (made of up to 3-inch diameter high-density polyethelene [HDPE]) from exploration wells would be tied into the CGF for gas metering and subsequent venting. A network of water lines exists on private lands in the project area. Short new lines (up to 6-inch diameter HDPE) would be required to collect produced water on the two federal sections; these would connect to the existing network. Water would be conveyed to a water containment reservoir (Figure 1.1). Each well would interconnect with the 12-inch trunkline via a 6-inch HDPE gathering line. Water lines would converge at the water-containment reservoir. Gas and

water lines would be installed adjacent to and overlapping with the access road ROWs. Power would be supplied by gas-driven engines, propane generators, or gas-powered generators fueled by produced gas.

Overall disturbance on federal land would be approximately 162.7 acres initially and 39.7 acres after preliminary reclamation (Table 2.1).

It is anticipated that it would take approximately 8 days to drill, log, and case each well utilizing a conventional rotary drilling rig and associated rig equipment. Two additional days would be required to run a bond log, perforate, and set a pump with a completion rig. As the project develops, road construction would occur concurrently with well drilling and testing (access roads to a given well would be constructed prior to drilling and testing), and although some level of activity would be continual, peak drilling and construction would be scheduled for the fourth quarter of 2001.

The anticipated life-of-project (LOP) would be from 5 to 30 years, depending upon the success of the exploration project, which is scheduled to occur for 18 months. Additional NEPA analyses would be conducted if additional facilities are required for project development.

2.1.1 Well Pad and Access Road Construction and Drilling Operations

All activities at each well on federal lands in the exploration area would follow procedures approved by the BLM in the well-specific APDs and their attached *Conditions of Approval*.

For all surface-disturbing activities requiring excavation, sufficient topsoil to facilitate revegetation would be segregated from subsoils, stockpiled, and replaced on the surface upon completion of operations as part of the reclamation and revegetation program. Topsoil stockpiles would be stabilized as necessary until used for reclamation. For development activities on private surface, topsoil salvage and replacement procedures would be implemented at the landowner's discretion.

Table 2.1 Types and Approximate Acreage of Disturbance on Federal Land of Proposed Action and No Action Surface Alternatives.

	Proposed Action					
	Initial Disturbance Area (acres)			Life-of-Project (LOP) Disturbance Area (acres)		
Type of Disturbance	Existing	Proposed	Total	Existing	Proposed	Total
Well pads[1]	0.0	10.8	10.8	0.0	2.7	2.7
Facilities corridors[2]	23.7	26.7	50.4	23.7	13.3	37.0
Interconnect pipeline[3,4]	0.0	101.5	101.5	0.0	0.0	0.0
Total	23.7	139.0	162.7	23.7	16.0	39.7

	No Action Alternative					
	Initial Disturbance Area (acres)			Life-of-Project (LOP) Disturbance Area (acres)		
Type of Disturbance	Existing	Proposed	Total	Existing	Proposed	Total
Well pads	0.0	0.0	0.0	0.0	0.0	0.0
Facilities corridors	23.7	0.0	23.7	23.7	0.0	23.7
Interconnect pipeline	0.0	0.0	0.0	0.0	0.0	0.0
Total	23.7	0.0	23.7	23.7	0.0	23.7

1 Assumes initial disturbance of 1.2 acres for each well pad and LOP disturbance of 0.3 acre per well pad.

2 Assumes 2.75 mi of new roads with parallel gas gathering and water discharge lines (80-ft average disturbance width). All disturbance except for the estimated 40-ft wide road travelway and adjacent ditches would be reclaimed for the LOP.

3 Assumes and average disturbance width of 90 ft along the entire 19.5-mi long corridor. An estimated 9.3 mi would cross federal land.

4 The compressor station (about 4.0 acres of disturbance) would be located on private land.

2.1.1.1 Well Pad and Road Construction

Well pads would be leveled and road ROWs constructed using standard cut-and-fill construction techniques and machinery.

Well Pad Construction. Major components of each well pad include a level area for placement/support of the drilling rig and other equipment and an earthen reserve pit to contain drilling fluids. The entire well pad would be cleared of vegetation, and up to 12 inches of topsoil would be removed from all areas of cut, fill, and/or subsoil storage. After topsoil has been removed, the pad would be graded using standard earth-moving equipment (e.g., dozers, scrapers) to prepare a level working surface. Each well location would be designed so that the amount of cut-and-fill material would roughly balance, where feasible, thereby minimizing the need to stockpile excess subsoil adjacent to the well location until site reclamation.

The reserve pit would be excavated using a dozer or other appropriate equipment. Materials excavated from the reserve pit would be stockpiled adjacent to the pit and used to backfill the pit during reclamation. Each reserve pit would be lined with reinforced synthetic liners. If necessary, the reserve pit would first receive a layer of bedding material (e.g., clay, sand) sufficient to prevent contact between the liner and any exposed rocks. The reserve pit would be fenced to protect livestock and wildlife until the pit is reclaimed.

The level area of the wellpad required for initial drilling and completion operations would be approximately 180 x 240 ft, including a reserve pit approximately 65 x 145 ft and 10 ft deep, so average surface disturbance would be about 1.2 acres/well.

Erosion control would be implemented, as necessary, at each well location through prompt revegetation of disturbed areas and by constructing surface water drainage controls such as berms, diversion ditches, and sediment ponds in accordance with the approved reclamation and

Storm Water Pollution Prevention Plans (SWPPPs). All diversion ditches and other surface water and erosion control structures at each location would be shown on maps provided with each APD. SWPPPs would be prepared for all well locations, access roads, and other disturbances of more than 5 acres, as required by the WDEQ.

Road Construction. Proper authorizations would be obtained for all roads, and all roads on federal lands required for the proposed project would be constructed following guidelines specified in the BLM *Manual 9113: Roads* (BLM 1985). Road authorization and use would be coordinated with other area users (e.g., appropriate easements/agreements would be established with private landowners). Roads to be used during construction would be marked with signs indicating which roads are the approved construction access roads. Figure 2.1 illustrates a typical road cross section with parallel natural gas and water gathering lines. Where feasible, gas and water gathering lines would be buried in a single trench under the access road travelway. The average travel surface width for gravel-surfaced local and resource roads would be 24 ft and 16 ft, respectively, with turnouts as necessary (100 ft long with 50-ft tapers spaced intervisibly at 1,000 ft), and all surface disturbance would be contained within authorized ROWs. Approximately 1.5 mi of existing developed road have already been upgraded, and approximately 6.5 mi of new road would be built. Figure 1.1 shows the proposed road locations. However, if existing developed roads cannot be adequately upgraded, new roads may be built at alternate locations to minimize potential adverse impacts, and existing developed roads may be closed and reclaimed. For the analysis of project impacts in this EA, all roads are considered local roads (Figure 2.1). Because roads and gathering lines primarily would be constructed within a single corridor, a corridor about 80 ft wide would be disturbed during construction. Where gas and water gathering lines would be buried under the access road travelway, disturbance width would be less than 80 ft.

Well pad and access road construction would require a maximum of four workers for a period of approximately 5 days per location. These workers would include both heavy equipment operators engaged in road and well pad construction and truck drivers hauling heavy equipment to and from locations. Construction workers would likely be hired locally and contracted by Williams or its agents.

Figure 2.1 Typical Access Road with Gas and Water Gathering Lines, Cross Section with Width Specifications for theProposed Road Type.

Local roads would provide the internal access network for the exploration area, whereas resource roads would be the spur roads that provide access to individual wells from local roads. Roads, including culvert design, improvements, erosion control, etc., would be constructed in conformance with BLM road standards. Design details would be provided with each APD and ROW application. Roads would be located to minimize disturbance and to avoid sensitive resources such as raptor nests and cultural resources. Primary access to the exploration area would be via the Hanna Draw Road (i.e., Carbon County Road 291), which traverses the exploration area. Topsoil on new road ROWs would be salvaged, stored in elongated piles within road ROWs, and seeded to prevent erosion as necessary. Available topsoil (up to 12 inches) would be stripped from all road corridors prior to commencement of construction activities, would be stockpiled, and would be redistributed and reseeded on backslope areas of the borrow ditch after completion of road construction activities. Borrow ditches would be reseeded in the first appropriated season after initial disturbance. If a well is determined to be unproductive, the entire road ROW would be recontoured and reclaimed as soon as practical using stockpiled topsoil and appropriate seeding techniques. Any large rocks that occurred on the ROW prior to construction would be scattered over the ROW after reseeding. Total surface disturbance from road ROWs (including disturbance for adjacent gas and water gathering lines) is estimated at 101.3 acres (50.4 acres on public land) initially and 62.5 acres (37.0 acres public land) for the LOP (Table 2.1).

All roads on federal land would be surfaced with appropriate locally available, weed-free materials according to BLM guidelines. Williams or its agents would acquire appropriate access permits from the Carbon County Road and Bridge Department.

2.1.1.2 Drilling, Casing, and Cementing

Drilling. Following construction of the well pad and access road for a given well, a rotary drilling rig would be transported via truck to the well pad and erected on-site. The level area of the well pad required for initial drilling and completion operations would be approximately 180 x 240 ft, including a reserve pit approximately 65 x 145 ft and 10 ft deep (Figure 2.2). Maximum disturbance at each location would be approximately 1.2 acres, including the area

Figure 2.2 Example Well Location Layout During Drilling.

required for cut/fill slopes and topsoil/subsoil stockpiles. Site-specific NEPA compliance would be completed for each well site on federal lands.

Approximately 8 days would be required to drill, log, and case each well using a conventional rotary drill rig and associated rig equipment. Wells would be drilled to coals in the Hanna Formation at depths of approximately 5,000 ft. The Hanna No. 2 coal is presently proposed for initial exploration (Figure 2.3), but other seams may be explored. Cuttings and all drilling fluids would be contained in the reserve pit, and drilling fluids would be recovered and re-used whenever practical. The reserve pit would be lined, as specified in APDs, to prevent loss of drilling fluids through seepage. If necessary, the reserve pit would first receive a layer of bedding material (e.g., clay, sand) sufficient to prevent contact between the liner and any exposed rocks. The reserve pit would be fenced to protect livestock and wildlife until the pit is reclaimed.

In the event that undesirable materials (e.g., hydrocarbon liquids) are inadvertently discharged to a reserve pit, they would be removed immediately and disposed of in accordance with WDEQ requirements. If any oil in the pit (as evidenced by a sheen on the water surface) is not immediately removed, the pit would be protected to prevent waterfowl use as directed by the BLM.

Approximately 6,000 42-gal barrels (bbl) of water would be required to drill each well (252,000 gal/well; 6,300,000 gal or 19.3 total acre-ft for all 25 wells), and this water would be obtained from the water produced during drilling. Water used to drill one well also may be re-used for drilling subsequent wells.

No abnormal temperatures or pressures or hydrogen sulfide are anticipated to be encountered during drilling. Any shallow water zones encountered would be reported and adequately protected.

Drilling rigs would be contracted by Williams from third parties and would typically employ four workers per 8-hour shift, with one crew on shift and two crews off. These crews would

Figure 2.3 Typical Wellbore Diagram.

reside at their own homes or other living quarters in nearby towns (e.g., Hanna, Rawlins, Sinclair). A number of additional personnel may be required to be on location during various stages of the drilling operation, including a geologist, a mud logger, and other service personnel. In some cases, these individuals would be required to remain on location 24 hours a day during drilling operations, and trailers would be provided on-site for their use.

If any spills of oil, gas, or other noxious fluids occur, Williams would immediately contact the BLM and any other regulatory agencies as necessary, and cleanup efforts would be initiated. These actions would occur at any stage of drilling, completion, operation, or abandonment of facilities.

During drilling and subsequent operations, all equipment and vehicles would be confined to access roads, well locations, and other areas specified in approved APDs, except in emergency situations.

Casing and Cementing. Fresh-water aquifers and potentially minable coal blocks would be protected by running casing--steel pipe--into the open borehole and cementing the casing into place (Figure 2.3). Cementing would also isolate all other formations in the hole and would effectively eliminate the possibility of contamination between hydrocarbon zones and/or water aquifers and other mineral resources. The quality of the primary cement job would be evaluated by running a wireline acoustical geophysical log (cement bond log or "CBL") through the production casing after the primary cement job has had sufficient time to set. When cement is adequately bonded to both the casing and the formation, a favorable acoustic coupling is developed. The degree of bonding within cemented intervals may be determined from the signature of the cased hole acoustic log (i.e., the cement bond log). Williams intends to use sufficient cement volumes to obtain full returns of cement to the surface and to run cement bond logs in all wells completed for production. Whenever partial or incomplete cement bonding is indicated within 100 ft above or below production zones, the casing would be perforated and additional amounts of cement would be pumped into the annulus to isolate the productive zones. A second cement bond log would then be run to determine the effectiveness of the additional cementing, and this procedure would be repeated as necessary to ensure adequate bonding.

2.1.2 Completion and Production Testing

In accordance with 43 C.F.R. 3164, a *Well Completion Report* would be filed with the BLM no later than 30 days after well completion. Following wellbore casing and cementing, potentially productive coal seams of the Hanna Formation would be perforated and tested to determine the ability of each to produce methane at commercially acceptable rates. In the Hanna Basin, Hanna Formation coal seams ("stringers") are typically 40-50 ft in individual thickness, and the total per well coal interval are typically 60-200 ft. During preparation for production testing, the rig used to drill the well would be replaced with a smaller service rig that would operate only during daylight hours. Smaller diameter (2 7/8-inch) tubing would be placed in the cased hole and pumping equipment set below the perforated intervals. Water would be pumped from the completed zone using sucker rod pumping units, progressive cavity pumps, or submersible pumps (Section 2.1.3) until methane flow is established. This procedure may require 560 days or more of pumping to initiate diagnostic gas flow rates. Pursuant to WOGCC regulations and/or BLM Notice to Lessee (NTL) 4A, gas flows would be measured at the surface, and noncommercial volumes of gas would be temporarily flared or vented under controlled conditions at the well site. Venting would be conducted in accordance with WOGCC regulations. Once the permitted venting limit is reached, wells would either be put into production or shut-in for later production. Produced water would flow through gathering lines buried below frostlines to the existing reservoir (see Section 2.1.7) where it would evaporate. Each well likely would be production tested for an estimated 6-18 months to evaluate the commercial feasibility of further development. Routine daily maintenance, including daily pump changes, would be required during the evaluation period.

Based on the results of this initial production test, the coals may be further studied by petroleum engineers to determine if gas flow rates may be augmented through fracture stimulation ("a frac"). A frac is designed to improve gas or fluid movement from the reservoir to the wellbore ("permeability"). In the course of a frac, fresh water or other water-based fluids are pumped down the wellbore and through the casing perforations under sufficiently high pressure to physically fracture the formation rock. Sand grains or other similar proppants are carried in suspension in fluids into the fractures. As the wellhead is opened at the surface, frac fluid flows

back into the wellbore and is discharged at the surface into the reserve pit. Successfully fractured formations will close on the proppants, leaving open channels for gas and liquid to be produced to the wellbore. Excess frac fluid would be evaporated or removed from the site for disposal at an authorized location outside the HDEPA or possibly re-used at another well. Wells may be fractured without proppant.

After reclamation of disturbed areas no longer needed for production, each producing location typically would occupy an area of approximately 0.3 acre.

Within 365 days after termination of drilling and completion activities, the liquid contents of the reserve pit, if any, would be removed and disposed of at an approved waste disposal facility. If adverse weather conditions prevent removal of the fluids from the reserve pit within 365 days, an extension may be granted by the BLM. If necessary, under special circumstances, reserve pit contents would be removed and disposed of at an appropriate facility and in a manner which satisfies all relevant state and federal regulations and stipulations. The reserve pit would be reclaimed by filling it with the spoil removed during initial pit construction, spreading previously stored topsoil, and reseeding according to BLM or surface owner specifications. Reserve pit back-filling and reseeding would not normally occur until after production testing, since the pit is generally used to hold liquids during such operations.

Production testing would, on average, require two workers for 90-540 days for every seven wells, for a total of seven workers (see Section 2.1.10).

2.1.3 Production

While natural gas production from wells may not occur for some time, to facilitate dewatering some well site production facilities would be installed once wells have been completed (see Section 2.1.8.2). A facilities/site security diagram (Figure 2.4) would be filed with the BLM within 30 days of installation. The operator would adhere to all site security regulations as specified in *Onshore Oil and Gas Order No. 3*.

Figure 2.4 Typical Producing Well Layout.

Rod-type pumping units or submersible pumps (powered by gas-driven engines, propane generators, or gas-powered generators fueled by produced gas) would be used to dewater the wells. In some wells, produced water and gas would be separated at the wellhead. Other wells would not require separators, as the water and gas would separate in the well casing. No uncontained surface discharge is proposed at this time. Water produced during initial production operations would be contained in reserve pits at each well location. All subsequent produced water would be contained in the reservoir. Williams has applied for an NPDES permit for the discharge of produced water into the containment reservoir (Appendix C). Water would be delivered from each well to the reservoir via water gathering lines (see Section 2.1.8 and Appendix B, Water Management Plan). Produced water quality would be monitored in accordance with state and federal regulations. Pumping units may be enclosed by a small shelter to avoid damage from wind, snow, and cold weather.

If the exploration field is economically productive, a small, centrally located, natural gas-fired compressor (e.g., 400 horsepower [hp]) would be installed on private land. Gas volumes would dictate the amount of compression required. Similarly, the 19.5-mi long pipeline would be constructed only if Williams deems it viable to transport gas from the field. Gas exiting the wellbore would be transported from each well through the natural gas gathering system to the CGF and compression station (see Section 2.1.4).

Williams anticipates production of up to 400 thousand cubic feet of gas per day (mcfgpd) from each well, which may require well site compressors. On-location compressors would be located and muffled to minimize noise and would comply with all applicable WDEQ, Air Quality Division (AQD) permitting requirements, as necessary. Williams would evaluate on-location compression needs as the project develops.

No electric-powered compression is proposed as part of the exploration project, and thus no electrical ROWs would be required.

All wells would be operated in a safe manner according to standard industry operating procedures. Routine maintenance of the producing wells would be necessary to maximize

performance and to detect operational difficulties. Each well site would be monitored daily to ensure operations are proceeding safely and efficiently. This visit would include, but would not be limited to, checking gauges, valves, fittings, and other on-site facilities. Routine on-site equipment maintenance would also be performed as necessary. All roads and well sites would be regularly inspected and maintained (e.g., regraded, resurfaced, watered) to minimize dust and erosion and to assure safe operations.

2.1.4 Compressor Station

If the pilot project proves successful, a methane compression facility may be constructed within the exploration area. Methane from the exploration area would be delivered to the compressor station via gas gathering lines. Once the methane reaches the compressor station, dehydration units would remove residual water from the gas, and this water would be evaporated from the dehydration unit. All of the applicant-committed practices applied to the proposed project would also be applied to the construction and operation of the compressor station and the pipeline (Section 2.1.13). Impacts of compressor station construction and operation are evaluated in this EA.

Williams would adhere to all applicable Wyoming Ambient Air Quality Standards (WAAQS), National Ambient Air Quality Standards (NAAQS), permit requirements (including preconstruction testing, and operating permits), and other regulations, as required by the WDEQ/AQD.

2.1.5 Workovers

Workovers are periodically necessary to correct downhole problems in a producing well to return the well to production. Workovers are implemented on an as-needed basis and are undertaken to increase or maintain production from the current downhole producing zone; to recomplete in a new zone; to lower operating costs by reducing water and/or sand production; or to return the well to its production objective by pulling and replacing leaking tubing or pulling

and repairing lift equipment. Workovers normally take 3 to 4 days and would be scheduled to minimize potential adverse effects to sensitive environmental resources.

2.1.6 Natural Gas Collection Lines

Gas collection lines for in-field gas collection (gathering system) would be installed to bring methane from individual well sites to the CGF and the interconnect pipeline. Gas collection lines would generally be located adjacent to roads or under the access road travelways, where feasible, and all necessary authorizing actions for the lines would be addressed prior to installation. A total of approximately 8.0 mi of gas and water collection lines would be installed within the 80-ft wide facilities corridor.

Sufficient topsoil to facilitate reclamation would be removed from collection line ROWs and stockpiled before construction; however, ROWs that do not require major excavation may be stripped of vegetation to ground level (scalped) by mechanical cutting, leaving topsoil intact and root masses relatively undisturbed. Scalping, coupled with ripping of compacted soils, would facilitate vegetation re-establishment.

A 3- to 5-ft deep trench would be excavated with a trencher or backhoe. Up to 3.0-inch diameter HDPE conduit would be buried at depths of 3.0-4.5 ft, except at major road and railroad crossings, where the depth would be at least 6 ft. Spoil and topsoil would be windrowed separately .

All of the project-wide environmental practices and protection measures identified in Section 2.1.13 would be applied to the construction and operation of gas collection lines.

2.1.7 Interconnect Pipeline

Depending upon the success of the pilot project, gas would be transported from the exploration area through a new interconnect pipeline connecting the field with an interstate gas pipeline along the Interstate 80 (I-80) corridor to the south. The interconnect pipeline generally would

be located along the same route as was proposed in the MetFuel EIS (Figure 1.2) but would extend about 12 mi further south. The pipeline would consist of 8- to 16-inch diameter steel pipe.

The construction corridor would be cleared of aboveground vegetation, obstacles, and up to 12 inches of topsoil, except in flagged areas of cultural significance where no topsoil would be removed. Typically, a 90-ft work space would be disturbed during pipeline construction. In areas of steep terrain, cuts, gullies, or stream crossings, some grading would be necessary to provide a safe and suitable working area; otherwise, no grading is proposed.

After the construction area is cleared and graded, a trench 3- to 5-ft deep would be excavated with a trencher or, in rocky areas or where the pipelines change direction, with a backhoe.

Pipe and other construction materials would be hauled to the pipeline corridor by semi-trucks and strung along the ROWs. One pipe yard occupying a maximum of approximately 2 acres would be located within the construction ROW.

A bending machine would be used to bend pipe to fit the trench. Sections of pipe would then be aligned and welded together, and joint coating would be applied. Cathodic protection to prevent corrosion would be installed according to industry standards within 1 year of pipeline installation. Side-boom caterpillars would be used to lower the pipe into the trench (Figure 2.5). The trench would be padded as necessary with sand or soil using ditch-padding techniques. After the pipeline is placed in the trench, the trench would be backfilled using an angle dozer or auger and the soil would be compacted to prevent subsidence. Any excavated material that cannot be placed in the trench would be disposed of in conformance with applicable landowner or agency requirements (e.g., spread/feathered over the disturbed area prior to topsoil replacement). No trench berms would remain on the surface unless approved by the BLM, and no rock foreign to the surface would remain exposed.

All paved roads and railroad crossings would be horizontally bored or directionally drilled to minimize disturbance to these areas. Boring and drilling sites would require some additional

Figure 2.5 Typical Pipeline Construction Layout (Cross Section).

disturbance outside the 90-ft construction ROW. Bore and drill sites would require up to 10,000 ft^2 (100 x 100 ft on each side of crossing), of which approximately 9,000 ft^2 would be within the construction corridor, for a total of 1,000 ft^2 additional disturbance per bore/drill. Assuming four potential bores/drills (the exact number to be determined when the pipeline alignment is finalized), an additional 4,000 ft^2 would be disturbed; however, no surface disturbance would occur on that portion of the ROW that was bored or drilled.

No new roads would be required for pipeline construction. Existing roads, fences, structures, or drainage facilities that are damaged during construction would be replaced or repaired to a condition equal to or better than that which existed before construction. Fences crossed during construction would remain down during daylight hours while construction is occurring; however, when daily construction activities are complete, fences would be reinstalled in a manner to minimize livestock passage. In the event that existing roads used to access the pipeline route require upgrades, appropriate on-site investigations (e.g., cultural resource inventories) would be conducted prior to road improvements, and if road repairs/upgrades are required, they would be done in accordance with BLM *Manual 9113: Roads* (BLM 1985).

After pipeline construction is complete, approximately 55 line markers would be installed above the pipe at line-of-site intervals and at road crossings to identify the approximate pipeline location within the ROW. Line markers would be equipped with anti-perching devices on areas within 2.0 mi of greater sage-grouse leks, would be colored to match the surrounding landscape, and would be strong enough to withstand livestock use for scratching. Approximately 528 cathodic protection test stations and five new block valves would also be installed, and all of these features would be located within the authorized ROW.

No new material or borrow sites or new rock disposal sites are anticipated to be necessary for pipeline construction. No construction would take place when the soil is too wet to adequately support construction equipment or when watershed damage is likely to occur. If equipment creates surface ruts more than 4 inches deep, Williams would suspend construction activities until the soil is sufficiently dry unless otherwise authorized by the BLM. No frozen soils or soil mixed with snow would be used in construction.

All equipment and vehicular access to the pipeline would be confined to existing BLM-approved roads and established ROWs. No new or rerouted roads would be required for pipeline construction or operation.

Equipment used to construct the proposed pipeline would include but is not limited to trenchers, tractor trailers, stringing trucks, 2-ton trucks, lowboy trucks, lube and fuel trucks, buses, pickup trucks, trenchers, ditch-padding machines, seed drillers, tractors, backhoes, trackhoes, side-boom tractors, dozers, welding trucks, and directional drilling or boring equipment.

2.1.8 Water Supply and Disposal

2.1.8.1 Water for Drilling

Water for drilling wells would come from produced water from existing wells. Water used to drill one well would be re-used to drill subsequent wells where practical.

2.1.8.2 Dewatering Operations

More than 90% of methane stored in coal is adsorbed onto coal surfaces or absorbed within the coal (Jones and DeBruin 1990). The Tertiary coals of the western Hanna Basin are water-bearing, and desorption of methane gas occurs when the formation hydrostatic pressure is reduced by pumping water out of the coalbed through a wellbore. As hydrostatic pressure drops, the physical bond between carbon (coal) and methane molecules is broken, and methane bubbles form and flow in a water solution towards the zone of lower pressure at the wellbore. Therefore, to create favorable conditions for the release of methane gas, water must be produced prior to and during methane extraction, especially during initial coalbed dewatering. Williams would file for the appropriation of the water rights for all produced waters, and dewatering permits would be obtained from the WSEO. If these waters are of sufficient quality and quantity, they may be made available to local users.

Based on limited data from the seven of the nine wells completed on private land, the maximum initial water discharge rate from each well would be about 550 barrels per day (bpd) (0.036 cubic feet per second [cfs]) (see Appendix B, Water Management Plan). The water discharge rate per well is expected to decrease to about 350 bpd (0.023 cfs) during the first 18 months of pumping. Actual discharge values may be greater or less depending on geologic conditions, pumping equipment limitations, interference of adjacent wells, and reservoir enhancement methods.

Pumping equipment used for the dewatering phase of the proposed project would be the same type generally used by the petroleum industry to lift oil and/or water (i.e., rod-type pumping units and/or electric submersible [downhole] pumps). Williams will likely use downhole progressive cavity (pc) pumps, which employ a mechanical drivehead, sucker rods inside a tubing string, and an engine powered by an electric generator, diesel, propane, or produced natural gas. These units would be selectively employed within the HDEPA and likely would be gasoline- or propane-powered during the early phases of development.

The pc-type pumping unit most likely to be used would be a BMW 175-6000, which employs a 30 hp motor and is capable of pumping a daily maximum rate of about 600 bpd (25,200 gal/day). These units are designed to be submerged in the wellbore below the standing fluid level at the bottom of the tubing string and below the intervals at which the coals are perforated. Electric power would be supplied at each well site by a propane-powered generator. Submersible pumps may be replaced by beam pumps at some well sites as water production rates decline--probably in the second year of production.

2.1.8.3 Disposal of Produced Water

Produced water would be disposed of in the existing reservoir constructed by Williams specifically for produced water disposal (Appendix B, Water Management Plan). Produced water would be transported from well locations to the reservoir via buried water pipelines (Figure 2.1) where it would evaporate. Produced water pipelines generally would be located between natural gas pipelines and roads within the 80-ft wide facilities corridor. The reservoir is unlined and impounded by an earthen dam. It is designed to contain all water produced by the

exploration project. The reservoir would have a maximum capacity of 500 acre-ft while maintaining a freeboard of 5 ft. The relationship between water elevation, reservoir area, and total storage is presented in Table 2.2.

The Water Management Plan (Appendix B) is designed to minimize peak water discharge volumes. Production wells would be scheduled to go online successively to flatten the peaks in the water production curve. During production activities, the maximum cumulative discharge rate for all wells in the exploration area would be about 13,750 bpd (0.89 cfs), whereas the steady state rate would be approximately 8,750 bpd (0.57 cfs). Water quality of the discharge water from wells on federal surface and mineral would be regulated pursuant to a WDEQ, Water Quality Division (WQD) NPDES permit, which has been applied for by Williams (Appendix C). Additionally, if approved by BLM and WDEQ/WQD, small quantities of suitable quality

Table 2.2 Reservoir Stage-Capacity-Area Relationship.

Elevation (ft)	Area (acres)	Total Storage (acre-ft)
6,896	0.27	0.00
6,898	4.40	4.40
6,900	14.02	22.55
6,902	20.14	56.71
6,904	25.42	102.27
6,906	30.05	157.74
6,908	33.98	221.77
6,910	37.69	293.44
6,912	41.35	372.48
6,914	44.77	458.62
6,915[1]	46.35	500.00
6,916	47.92	551.33
6,918	50.93	650.19
6,920	53.92	755.04[2]

[1] Reservoir designed for 500 acre-ft of storage with 5 ft of freeboard.
[2] Maximum reservoir capacity.

produced water may be used on project-required roads and during pipeline construction for dust suppression.

2.1.8.4 Hydrostatic Testing

The interconnect pipeline would be pressure-tested with water once it is in place. The pipeline would be filled with water and pressurized to 125% of its designated operating pressure for 8 hours to verify integrity, or other requirements identified in 49 C.F.R. 195.303 would be applied. Test water would be acquired from the Town of Hanna. A total of approximately 620,000 gal (1.9 acre-ft) of water would be required for pipeline testing.

All hydrostatic water testing and discharge would be approved by the WDEQ/WQD. A hydrostatic testing plan would be prepared. Test water would be discharged to the reservoir or to ephemeral drainages at a rate commensurate with the drainage capacity and, prior to release, hydrostatic test water would be tested and processed, if necessary, to ensure that it meets local, state, and federal water quality standards. Before discharging any hydrostatic test water from the pipeline, suitable energy dissipaters would be installed at pipeline outlets to prevent scouring or erosion. Materials such as sandbags, filters, straw bales (weed free), or rock would be placed in the receiving channel. The design and placement of any energy dissipating structures placed on federal land would be approved by BLM prior to installation. Upon completion of testing, all installed materials and objects would be removed from the site.

2.1.9 Hazardous Materials

Williams would maintain files containing current Material Safety Data Sheets (MSDS) for all chemicals, compounds, and/or substances that would be used during the course of construction, drilling, completion, and production operations. Williams has reviewed the EPA's *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act of 1986* (SARA), as amended, to identify any hazardous substances proposed for use in this project, as well as the U.S. Environmental Protection Agency's (EPA's)

List of Extremely Hazardous Substances as defined in 40 C.F.R. 355, as amended. Substances that may be used or produced by this project are listed in Appendix E.

Williams and its contractors would comply with all applicable hazardous material laws and regulations existing or hereafter enacted or promulgated. Williams and its contractors would locate, handle, and store hazardous substances in an appropriate manner that prevents contamination of soil and water resources or otherwise sensitive environments. Any release of hazardous substances (leaks, spills, etc.) in excess of the reportable quantity as established by 40 C.F.R. Part 117 would be reported as required by the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), as amended. If the release of a hazardous substance in a reportable quantity occurs, a copy of the report would be furnished to the BLM and all other appropriate federal and state agencies.

Williams would evaluate its overall field operations and prepare and implement Spill Prevention, Control, and Countermeasure (SPCC) Plans, as necessary. The plans would include accidental discharge reporting, cleanup, and maintenance procedures. Copies of all plans would be available to all appropriate Williams personnel, contractors, and field workers. Copies would also be kept at Williams's Denver, Colorado, office, together with a Hazardous Communication Program. SARA Title III (community right-to-know) information would be submitted annually as required, with copies kept in Williams's office. A waste minimization plan would not be required since Williams does not generate hazardous waste; however, Williams would employ measures to minimize the amount of all wastes generated.

Hazardous chemicals contained in diesel fuel, gasoline, and coolant (ethylene glycol) would not be stored in floodplains or near live water, nor would any vehicle refueling occur in such areas. Fuels and coolants that may enter floodplains would be contained in the fuel tanks of vehicles or other equipment, and the chance of a spill would be negligible.

2.1.10 Workforce Requirements

A total of approximately 15.0 worker-years would be required for gas field development and operation over the LOP (Table 2.3). Pipeline construction would require about 40 workers for 3 months (40 workers x 90 days = 14 worker-years). Additional workers would be used for

Table 2.3 Estimated Workforce Requirements.[1]

Assignment	Worker-days Per Well[2]	Total Worker-years for Project[2]
Well Construction and Development		
Construction (3 days x 4 workers)	12	1.2
Drilling (8 days x 4 workers x 3 shifts)	96	9.2
Completion (4-day average x 3 workers)	12	1.2
Operations and Maintenance		
Production (18-month exploration period)[3]	154	14.8
Abandonment (Reclamation) (2 days x 2 workers)	4	0.4
Total	278	26.8

1 Assuming that all 25 wells are drilled and completed as producers.
2 1 worker-day = 8 hours; 260 worker-days = 1 worker-year.
3 Assumes two workers per seven wells for 18 months during production testing.

surveying, engineering, maintenance, inspection, and other specialty services. Construction workers would be hired from the local work force when available; otherwise, workers from outside the area would be hired.

2.1.11 Field Camps

No field camps are proposed for the project. Project personnel would commute to the work site daily, most likely from the Hanna, Rawlins, and Sinclair areas.

2.1.12 Abandonment and Reclamation

Reclamation would be conducted on all disturbed public lands in compliance with the BLM *Wyoming Policy on Reclamation* (BLM 1990b). The short-term goal of the reclamation program is to stabilize disturbed areas as soon as possible after disturbance to protect sites and adjacent undisturbed areas from degradation. The long-term goal is to return the land to conditions approximating those that existed prior to disturbance.

Reclamation would occur during two phases of the proposed project. Initially, well pads and facilities corridors would be partially reclaimed after well testing and production/ancillary facilities are installed. This initial reclamation would reduce the amount of disturbed area to only that necessary for production operations. Final reclamation at the end of the LOP would involve reclamation of all remaining disturbed areas. In addition, all unproductive well sites and the ROWs to these sites would be reclaimed as soon as practical during the LOP.

2.1.12.1 Initial Reclamation

After installation of production equipment, the well pad needed for a producing well would be reduced from approximately 1.2 acres to approximately 0.3 acre. Drilling and other fluids contained in reserve pits would be evaporated and covered in place as authorized by the BLM and/or WOGCC. If necessary, the material would be removed from pits and disposed of at an authorized location outside of the HDEPA (e.g., existing lined evaporation ponds or injector wells). The unused portion of the pad would be recontoured and reseeded within 1 year. Reclamation specifications, including methods and seed mixes, would be developed by Williams in consultation with the BLM or the private landowner. Reseeding would also be performed on all portions of roads, gathering line ROWs, the pipeline ROW, and well pads that do not need to remain disturbed during production. The entire pad and resource road for all unproductive locations would be reclaimed according to BLM or private landowner specifications as soon as possible after testing. Wells would be plugged and abandoned as authorized by BLM and/or WOGCC. Alternative WDEQ-, WOGCC-, BLM-, and Mine Safety and Health Administration-(MSHA-) approved plugging procedures may be employed at specific public land locations and within specific coal seams to ensure that minable coal seams are protected.

After the exploration phase of the project, water in the reservoir would be allowed to evaporate. The private landowner may wish to maintain a reservoir for stock watering, in which case Williams would lower the dam so that the reservoir's size is more appropriate for use as a stock pond. If the landowner does not wish to use the reservoir, the dam would be removed after all water has evaporated, and the area would be reclaimed.

2.1.12.2 Final Reclamation/Abandonment

At the end of the pilot project's life (from 5 to 30 years), additional NEPA analyses would be conducted for project continuance or Williams would obtain the necessary authorizations from the appropriate regulatory agencies or private landowners to abandon facilities. Wells would be permanently or temporarily plugged or shut-in until decisions are reached regarding future production options. Pipelines would be purged of all combustible products and retired in place or removed, based on authorizing agency or landowner specifications. All aboveground facilities would be removed, and all unsalvageable materials would be disposed of at authorized sites. Roads would be reclaimed or left in place based on authorizing agency or landowner preference. Reclamation procedures would be based on site-specific requirements and techniques commonly employed at the time the area is reclaimed. Regrading, topsoiling, and revegetation of disturbed lands would be completed. Abandoned ROWs would revert to the private landowner or appropriate agency control. Compacted areas would be thoroughly ripped to a depth of 12-18 inches before topsoil is replaced. A seed mix approved by the BLM or private landowner would be broadcast or drill seeded.

2.1.13 Project-Wide Environmental Practices and Protection Measures

The following section describes applicant-committed and agency-required measures and procedures that would be implemented to avoid or mitigate resource or other land use impacts within the HDEPA. The BLM may waive mitigation measures and design features if after a thorough analysis the BLM determines that the resource(s) for which the measure was developed would not be impacted and/or alternative BLM-approved measures or guidance for protecting the resource(s) are developed (e.g., alternate survey methodologies). Further site-specific mitigation measures may be identified during NEPA, APD, and ROW application processes.

With the exception of environmental practices and protection measures for cultural resources, paleontological resources, and greater sage-grouse, mitigation measures identified in this EA would be adhered to on federal and private land, subject to landowner preferences or agreements with Williams. Mitigation for cultural resources, paleontological resources, and greater sage-grouse would be applied on all federal land and on private land affected by any federal undertaking unless landowner denial for access is documented in writing.

2.1.13.1 Preconstruction Planning and Design Measures

Well pads and associated access roads and gathering lines and the interconnect pipeline would be designed and located to minimize disturbance to areas of high wildlife habitat and/or recreational value, including wetlands and riparian areas.

To allow project activities to proceed in restricted areas and/or during periods of restriction (e.g., mild winters, unused raptor nests or potential greater sage-grouse breeding/nesting sites, etc.), approval from the BLM in consultation with other agency personnel (e.g., Wyoming Game and Fish Department [WGFD], U.S. Fish and Wildlife Service [USFWS], the U.S. Army Corps of Engineers (COE), and State Historic Preservation Office [SHPO]) would be required. This approval would be acquired prior to the initiation of specific project activities (i.e., well pad construction, drilling, completion, and facility installation) on areas requiring federal authorization when sensitive resource constraints are involved.

2.1.13.2 Disposal of Sewage, Garbage, and Other Waste Material

Portable self-contained chemical toilets would be provided for human waste disposal. Upon completion of operations, or as required, toilet holding tanks would be pumped and their contents disposed of at an approved sewage facility in accordance with applicable rules and regulations regarding sewage treatment and disposal. Each well site would be provided with one or more such facilities during drilling and completion operations.

All garbage , trash, refuse, etc., would be collected in self-contained portable dumpsters or trash cages, and, upon completion of operations or as needed, the accumulated trash would be hauled off-site to an approved sanitary landfill. No trash would be placed in the reserve pit.

As soon as practical after removal of the drilling rig, all debris and other waste materials not contained in the trash cage would be cleaned up, removed from the well location, and disposed of at an approved landfill. No potentially harmful materials or substances would be left on location.

2.1.13.3 Cultural Resources

Impacts to cultural resources would be mitigated following procedures as specified in 36 C.F.R. 800 and/or the national programmatic agreement for cultural resources and statewide protocol. Class I and Class III inventories would be conducted prior to disturbance on all federal lands and on state and private lands affected by federal undertakings unless landowner denial for access is documented in writing. Where landowners deny access, alternative cultural resource mitigation resolution methodologies may be applied or the development may be denied. In selected areas identified by the BLM, cultural resource surveys may require testing and/or mitigation to determine significance. All resources identified during these inventories would be evaluated for eligibility for the NRHP by the BLM, and the SHPO would be consulted as necessary under the statewide protocol. In addition, all eligible or listed sites identified in Class I and Class III inventories would be avoided or mitigated, as would areas with high potential for significant cultural deposits--such as aeolian deposits, alluvial deposits along perennial waterways and other major drainages and terraces, and colluvial deposits at the base of low slopes and hills, where possible. If any NRHP (eligible or listed) sites found within proposed disturbance areas cannot be avoided, a data recovery program or other mitigation would be implemented as deemed appropriate by the BLM in consultation with the SHPO, the Advisory Council on Historic Preservation as necessary, and Williams. Cultural sites identified during inventories would be avoided, where possible.

If a large number of sites cannot be avoided or other adverse effects may occur, a programmatic agreement among the aforementioned parties may be developed. Programmatic agreements would usually be in place when properties are subjected to mitigation through data recovery. Additionally, programmatic agreements and/or discovery plans may be required to be in place prior to approval of APDs or ROW applications in areas with high densities of cultural resource sites, which may occur along culturally sensitive areas such as the ephemeral drainages that flow through the HDEPA.

In addition to Class I and Class III inventories, construction activities in areas where the BLM believes there is a high potential for buried cultural deposits may be monitored by a

BLM-permitted archaeologist. If historic or prehistoric materials are discovered on public land by Williams or its contractors during construction, further surface-disturbing activities at the site (in an area defined by the BLM) would cease immediately, and the BLM would be notified by Williams to assure proper handling of the discovery by qualified archaeologists. An evaluation would be made by the BLM to determine appropriate actions to prevent the loss of significant cultural resources. Williams may be responsible for the cost of site evaluation and mitigation; any decision as to proper mitigation (e.g., data recovery) would be made by the BLM after consulting the SHPO, the Advisory Council on Historic Preservation as appropriate, and Williams.

The BLM would require that all field personnel be informed by Williams of the importance of cultural resources and the regulatory obligations to protect such resources. Any cultural resource (historic or prehistoric site or object) discovered on public land by Williams or any person working on their behalf would be reported immediately to the BLM. The BLM would require Williams to instruct field personnel not to disturb cultural resource sites or collect artifacts and that disturbance and collection of cultural materials from public land is prohibited and against the law.

2.1.13.4 Paleontological Resources

If paleontological resources are uncovered during ground-disturbing activities, Williams would suspend all operations that may further disturb such materials and immediately contact the BLM, who would arrange for a determination of significance and, if necessary, would recommend a recovery or avoidance plan. Mitigation of paleontological resources would be on a case-by-case basis, and Williams would incur costs associated with BLM-required mitigations. Surface-disturbing activities would not resume until a Notice to Proceed is issued by the BLM.

2.1.13.5 Nonnative Invasive Species

Williams would control nonnative invasive species along ROWs and at wellpads, as well as on areas where the weeds originate on the ROW and invade adjacent areas. A list of nonnative

invasive species is provided in Section 3.2.1.3, which was obtained from the BLM and Carbon County Weed and Pest Office. On BLM lands, an approved Pesticide Use Proposal would be obtained before the application of herbicides or other pesticides for the control of nonnative invasive species.

Herbicide applications would be kept at least 500 ft from known special status plant populations.

Removal or disturbance of vegetation would be kept to a minimum through construction site management by utilizing previously disturbed areas, using existing ROWs, designating limited equipment/materials storage yards and staging areas, and other appropriate means.

Williams would seed and stabilize disturbed areas in accordance with BLM-approved reclamation guidelines and/or private landowner specifications.

2.1.13.6 Vegetation

Removal or disturbance of vegetation would be kept to a minimum through construction site management by utilizing previously disturbed areas, using existing ROWs, designating limited equipment/materials storage yards and staging areas, and other appropriate means.

Vegetation and soil removal would be accomplished in a manner that would minimize erosion and sedimentation.

Williams would seed and stabilize disturbed areas in accordance with BLM-approved reclamation guidelines and/or private landowner specifications.

2.1.13.7 Wetlands, Other Special Aquatic Sites, and Other Waters of the U.S.

Williams would evaluate all project facility sites for occurrence of wetlands, other special aquatic sites, and other waters of the U.S. according to COE's requirements. Efforts would be made to avoid these sensitive areas. If wetlands or other special aquatic sites, riparian areas, streams, and

and WDEQ Section 401 ephemeral/intermittent stream channels are likely to be disturbed, COE Section 404 permits/authorizations would be obtained as necessary, and appropriate mitigation would be implemented.

2.1.13.8 Road Construction/Transportation

Existing roads would be used to the maximum extent possible and upgraded as necessary. To decrease potential impacts, the number and mileage of roads would be limited by discouraging development of looped roads and by accessing wells from short resource roads off local roads. All roads would be constructed for the specific purpose of field development. Site-specific analysis under standard BLM procedures would be conducted for all roads during development.

All roads would be constructed with adequate drainage and erosion control structures (i.e., relief culverts, drainage culverts, wing ditches, etc.). Details would be provided in each APD and ROW application.

Roads would be built, surfaced, and maintained to provide safe operating conditions at all times as determined by the BLM, and all roads in areas of rough terrain or high erosion potential would be designed and monitored during construction by a professional engineer. The area disturbed would be minimized to reduce impacts and to reduce the area requiring reclamation.

All development activities along approved ROWs would be restricted to areas authorized in approved ROWs.

Available topsoil (up to 12 inches) would be stripped from all road corridors prior to commencement of construction activities, would be stockpiled, and would be redistributed and reseeded on backslope areas of the borrow ditch after completion of road construction activities. Borrow ditches would be reseeded in the first appropriate season after initial disturbance.

All project-related roads not required for routine operation and maintenance of producing wells or ancillary facilities would be closed and reclaimed as soon as possible as directed by the BLM

or private landowner. As necessary, these roads would be permanently blocked, recontoured, reclaimed, and revegetated by Williams, as would disturbed areas associated with permanently plugged and abandoned wells.

Williams would be responsible for maintenance of roads in the HDEPA and for closure of roads following production activities.

Williams would maintain roads in a safe usable condition. A regular maintenance program would include, but not be limited to, blading, ditching, culvert and cattleguard maintenance/ replacement, and surfacing, as needed. Design, construction, and maintenance of roads would be in compliance with the standards contained in BLM Manual 9113: Roads (BLM 1985), and in the "Gold Book," *Oil and Gas Surface Operating Standards for Oil and Gas Exploration and Development, Third Edition* (BLM and U.S. Forest Service 1989). No off-road travel would occur, except in emergency situations.

During drilling and production operations, traffic would be restricted to Carbon County Road 291, and roads developed for the project. Use of unimproved roads would be allowed only in emergency situations. Speed limits would be set commensurate with road type, traffic volume, vehicle types, and site-specific condition, as necessary, to assure safe and efficient traffic flows. Signs would be placed along roads, as necessary, to identify speed limits, travel restrictions, and other standard traffic control information. In addition, newly developed or improved roads through crucial wildlife areas would be gated and locked as directed by the BLM to prevent unnecessary wildlife disturbances.

Williams would comply with existing federal, state, and county requirements and restrictions to protect road networks and the traveling public.

Special arrangement would be made with the Wyoming Department of Transportation (WDOT) and Carbon County to transport oversize loads to the HDEPA. Otherwise, load limits would be observed at all times to prevent damage to existing road surfaces.

2.1.13.9 Hazardous Materials

Williams and its contractors would manage all hazardous materials in compliance with all federal, state, and local regulations. If necessary, a SPCC Plan would be in place and would be followed in the event of a spill. Williams would prepare a field-wide SPCC Plan and, after each well is drilled and determined to be suitable for production, would prepare a SPCC Plan specifically for that well. Copies of the SPCC Plans would be given to all appropriate Williams personnel, contractors, and field personnel and would also be available at Williams's Denver, Colorado, office.

2.1.13.10 Air Quality

Williams would adhere to all applicable WAAQS, NAAQS, and permit requirements, including preconstruction testing, operating permits, and other regulations, as required by the WDEQ/AQD.

Williams would initiate immediate abatement of fugitive dust by application of water, chemical dust suppressants, or other measures on federal lands and during times of high use (i.e., construction, drilling, and workover operations) when air quality, soil loss, or safety concerns are identified by the BLM or the WDEQ/AQD. These concerns include, but are not limited to, potential exceedences of applicable air quality standards. The BLM would approve dust control measures, locations, and application rates. If watering is the approved control measure, Williams would obtain water from BLM-approved sources, possibly including the water produced from existing CBM wells. Use of produced water for uses other than disposal in the reservoir would be approved by WDEQ prior to implementing the alternate use.

2.1.13.11 Topography and Physiography

The BLM may deny all proposed surface disturbances, except those associated with pipeline construction, within 500 ft of perennial surface water and/or wetland areas and/or within 100 ft of intermittent and ephemeral drainage channels. Additionally, the BLM may deny activities in

areas with high erosion potential and/or rugged topography. Any disturbance in the aforementioned areas would require site-specific mitigations. All roads would be crowned, ditched, and appropriately surfaced (e.g., graveled).

Areas with high erosion potential and/or rugged topography (i.e., steep slopes, stabilized sand dunes, floodplains, unstable soils) would be avoided where practical. Special mitigation measures to control erosion would be applied to such areas if they are disturbed.

Upon completion of construction and/or production activities, Williams would restore the topography to near pre-existing contours at well locations, facilities corridors, pipelines, and other facility sites.

2.1.13.12 Soils

The BLM may deny all proposed surface disturbances, except those associated with pipeline construction, within 500 ft of perennial surface water and/or wetland areas and/or within 100 ft of intermittent and ephemeral drainage channels.

All roads would be crowned, ditched, and appropriately surfaced (e.g., graveled). The BLM may require Williams to apply gravel or other appropriate road-surfacing materials to specific HDEPA roads. Five feet of fill may be required over reclaimed reserve pits. The BLM may also limit surface disturbance (e.g., limiting ROW surface grading) during gas and water line and interconnect pipeline construction.

Sufficient topsoil to facilitate revegetation would be segregated from subsoils during all construction operations and returned to the surface upon completion of operations. Topsoil stockpiles would be seeded or otherwise protected to prevent erosion and to maintain soil microflora and microfauna.

Williams would keep the area of disturbance to the minimum necessary for drilling activities and subsequent production activities while providing for safety.

No off-road travel would occur except in emergency situations.

Williams would minimize project-related travel during periods when soils are saturated and excessive road rutting (e.g., >4 inches) may occur.

Where practical, Williams would locate gas and water gathering lines immediately adjacent to roads or existing utility corridors to avoid creating additional disturbance.

Surface disturbance and/or occupancy would not occur on slopes in excess of 25%, nor would construction occur with frozen or saturated soil material or when watershed damage is likely, unless an adequate plan is submitted to the BLM that demonstrates potential impacts would be mitigated.

Temporary erosion control measures such as mulch, jute netting, or other appropriate methods would be used on unstable soils, steep slopes, and wetland areas to prevent erosion and sedimentation until vegetation becomes established.

Williams would minimize disturbance to vegetated cuts and fills on new and existing roads.

Williams would replace topsoil or suitable growth materials over all disturbed surfaces prior to revegetation.

Williams would revegetate all disturbed sites as soon as practical following disturbance.

2.1.13.13 Water Resources

Williams would adhere to the mitigation and monitoring measures identified in WDEQ/WQD water discharge permits. All project actions would be conducted in compliance with the *Clean Water Act*.

Williams would follow all practical alternatives and designs to limit disturbance within drainage channels, including ephemeral and intermittent draws.

The BLM may deny all proposed surface disturbances, except those associated with interconnect pipeline construction, within 500 ft of perennial surface water and/or wetland areas and/or within 100 ft of intermittent and ephemeral drainage channels.

All roads on federal lands would be crowned, ditched, and appropriately surfaced (e.g., graveled). The BLM may require Williams to apply gravel or other appropriate road-surfacing materials to specific HDEPA roads on federal land. Five feet of fill may be required over reclaimed reserve pits. The BLM may also limit surface disturbance (e.g., limiting ROW surface grading) during gas and water line and interconnect pipeline construction.

Williams would complete the necessary notifications, documentation, or permit acquisition to ensure project compliance with Sections 401 and 404 of the *Clean Water Act*.

No surface disturbance would occur within 100 ft of intermittent and ephemeral drainages, where practical.

Where wetlands, riparian areas, or stream, river, or ephemeral drainage channels must be disturbed, the following measures would be employed.

1) Wetland and flood-prone areas would be crossed during dry conditions (i.e., late summer, fall, or dry winters). Winter construction activities would only occur prior to soil freezing or after soils have thawed.
2) Streams, wetlands, and riparian areas disturbed during project construction would be restored as near as practicable to preproject conditions. If impermeable soils contributed to wetland formation, soils would be compacted to re-establish impermeability.
3) Perennial water crossings and facilities construction adjacent to such waters would not be constructed during important fish spawning periods in those waters.
4) Streams would be crossed perpendicular to flow, where practical.

5) Wetland topsoil would be selectively handled.
6) Recontouring and BLM-approved native species would be used to revegetate the banks to aid in soil stabilization.
7) Revegetation operations would begin on impacted areas in the first appropriate season after completion of project activities.

The discharge of all water (storm water, produced water) would occur in conformance with WDEQ/WQD, BLM, and WOGCC rules and regulations (WDEQ 1978; *BLM Onshore Oil and Gas Order No. 7*).

Mitigation to lessen any impacts from flooding or high flows during and after construction would include the re-establishment of existing contours, implementation of proper erosion and sediment control procedures (e.g., install interceptor ditches around well pads, sediment traps, waterbars, etc.), and prompt revegetation of all disturbed areas.

Current water uses on and adjacent to the HDEPA would be protected, and project activities would be conducted to prevent adverse effects on water quality and quantity as required by federal and state regulations.

BLM/WOGCC casing and cementing requirements would be implemented to protect all subsurface mineral- and water-bearing zones in accordance with standard oil-field practices.

2.1.13.14 Noise and Odor

Noise and odor on the HDEPA would be minimized by muffling and maintaining all internal combustion engines.

2.1.13.15 Wildlife and Fisheries

Removal or disturbance of vegetation would be minimized through construction site management (e.g., by utilizing previously disturbed areas, using existing ROWs, designating limited

equipment/materials storage yards and staging areas, scalping), and Williams would develop and implement detailed reclamation specifications including stabilizing and revegetating disturbed areas to minimize impacts from project-related activities.

To minimize wildlife mortality due to vehicle collisions, Williams would advise project personnel regarding appropriate speed limits on designated access roads. Potential increases in poaching would be minimized through employee and contractor education regarding wildlife laws. If violations are discovered, the offending employee or contractor would be disciplined and may be dismissed by Williams and/or prosecuted by the WGFD and/or USFWS.

Firearms and dogs would not be allowed on-site by project employees. Williams would enforce their company's existing drug, alcohol, and firearms policies.

To protect wildlife habitat, project-related travel would be restricted to designated access roads--no off-road travel would be allowed except in emergencies.

Potential impacts to fisheries would be minimized by using proper erosion control techniques (e.g., water bars, jute netting, rip-rap, mulch). Construction within 500 ft of open water and 100 ft of intermittent or ephemeral channels would be avoided unless otherwise authorized by BLM. Channel crossings requiring trenching would be constructed when flows are not expected (late summer or fall). All necessary crossings would be constructed nearly perpendicular (at right angles) to flow.

Reserve pits or other project-related impoundments potentially hazardous to wildlife would be adequately protected (e.g., fenced, netted) to prohibit wildlife access as directed by the BLM and to ensure protection of migratory birds and other wildlife.

Williams would implement policies designed to control poaching and littering and would notify all employees (contract and company) that conviction of a major game violation may result in disciplinary action. Contractors would be informed that any intentional poaching or littering within the HDEPA may result in dismissal.

Well construction and drilling activities and other facilities development on crucial big game winter range designated in this EA would be curtailed during critical winter periods (November 15 through April 30) unless exceptions are granted by the BLM pursuant to their rules, regulations, and policies.

ROW fence erection would be minimized and any necessary ROW fences would meet BLM and WGFD approval for facilitating wildlife movement. Wildlife-proof fencing would be constructed around areas potentially hazardous to wildlife (e.g., reserve pit, toxic materials storage location) as deemed necessary by the BLM and around reclaimed areas if it is determined that wildlife use is impeding successful re-establishment of vegetation.

Proposed disturbance within 0.5 to 1.0 mi of identified raptor nests would require survey by a qualified biologist to determine nest activity status prior to commencement of drilling and construction during the raptor nesting period. If an active raptor nest is identified within 0.5-1.0 mi (depending on species and line of sight) of a proposed site, Williams would restrict construction during the critical nesting season for that species.

Known active greater sage-grouse leks and adjacent public lands (2.0-mi radius from lek centers) would be avoided during the breeding and nesting season (March 1 through June 30), and no surface occupancy would be allowed on public lands within 0.25 mi of known active greater sage-grouse lek sites. Construction activities on public lands in greater sage-grouse nesting habitat within 2.0 mi of active greater sage-grouse leks would not occur without a BLM-approved biologist first surveying for greater sage-grouse nests, and if a nest is found, the area would be avoided until after nesting is complete.

2.1.13.16 Threatened, Endangered, Proposed, Candidate, and Sensitive Animal and Plant Species

All Species

1) BLM would consult with USFWS as required by Section 7 of the *Endangered Species Act* (ESA) to ensure the protection of threatened, endangered, proposed, and candidate (TEP&C) species.

2) To ensure construction activities are conducted in accordance with required mitigations, a BLM-approved biologist would be on-site during construction as deemed appropriate by the BLM and as identified during APD and ROW application processing.

3) Well pads, roads, gas and water gathering lines, the interconnect pipeline, and ancillary facilities would be located and designed to minimize disturbance in areas of high wildlife habitat value (e.g., prairie dog colonies, suitable mountain plover habitat, greater sage-grouse leks, cushion plant communities [i.e., mountain plover nesting habitat], playas, wetlands, and riparian areas).

4) Areas with high erosion potential and/or rugged topography (steep slopes, stabilized sand dunes, floodplains, unstable soil) would be avoided, where practical.

5) Areas potentially hazardous to threatened and endangered (T&E) or other sensitive species (e.g., reserve pits, evaporation pits, hazardous material storage areas) would be adequately protected (e.g., fenced, netted) to prevent access by wildlife and to ensure protection of migratory birds and other wildlife as deemed necessary by the BLM.

6) To protect plant populations and wildlife habitat, project-related travel would be restricted to designated access roads--no off-road travel would be allowed except in emergencies.

7) Wildlife-proof fencing would be utilized on reclaimed areas if it is determined that wildlife species and/or livestock are impeding successful vegetation establishment.

8) Williams would finance site-specific surveys for TEP&C and other sensitive plant species (e.g., blowout [Hayden's] penstemon) prior to any surface disturbance in areas determined by the BLM to contain potential habitat for such species (BLM

Directive USDI-BLM 6840). These surveys would be completed by a qualified botanist as authorized by the BLM, and this botanist would be subject to BLM's special status plant survey policy requirements. Data from these surveys would be provided to the BLM, and if any sensitive plant species are found they would be avoided or if their habitats are found BLM/USFWS recommendations for avoidance or mitigation would be implemented. Project facilities would be relocated, if deemed necessary by BLM, to avoid TEP&C and other sensitive plant species and/or their habitat.

9) Herbicide applications would be prohibited within 500 ft of known sensitive plant populations.

10) Site-specific surveys for TEP&C (e.g., black-footed ferret, mountain plover) and other sensitive animal species would be conducted prior to surface disturbance in areas determined by the BLM to contain potential habitat for such species pursuant to BLM Directive USDI-BLM 6840. These surveys would be completed by the BLM and/or a BLM-authorized Williams-financed biologist prior to disturbance. Surveys would focus on those TEP&C species known to occur on the HDEPA, as well as those potentially occurring in the area. If TEP&C or other sensitive animal species are found on the HDEPA, construction activities would be delayed, the BLM and USFWS would be notified, and appropriate avoidance and/or protection measures would be implemented as determined necessary during conferencing and consultation. Habitats where TEP&C and other sensitive animal species are found or are likely to occur would be avoided, if deemed necessary by BLM, through relocation of project facilities.

11) Pursuant to the ESA, Williams would adhere to all survey, mitigation, and monitoring requirements identified in the Biological Assessment (BA) (Appendix D) and USFWS Biological Opinion (BO) for this project.

Black-footed Ferret

1) Williams and its contractors would be shown how to identify black-footed ferret and their sign and would be provided with information about its habitat requirements, natural history, status, threats, possible impacts of gas development activities, and ways to minimize these impacts.

2) All active white-tailed prairie dog towns/complexes would be mapped within the HDEPA on federal land beginning in 2002 and every 3-5 years thereafter throughout the LOP. Burrow density determinations would not be necessary because any colonies within the HDEPA are part of the large complex supporting the reintroduced black-footed ferret population.

3) Attempts would be made to locate all project components at least 50 m (164 ft) from these towns/complexes on federal land to avoid direct town/complex disturbance.

4) Surface-disturbing activities would not occur in potential black-footed ferret habitat (i.e., active prairie dog colonies) on federal land, unless the area has been surveyed within the previous 12 months for black-footed ferret pursuant to USFWS (1989) guidelines or other BLM- and USFWS-approved methodology.

5) In the event a black-footed ferret or its sign is found, the BLM Authorized Officer would stop all action on the application in hand and/or action on any future application that may directly, indirectly, or cumulatively affect the colony/complex and would initiate Section 7(a)(4) conferencing with the USFWS. No project-related activities will be allowed to proceed until the USFWS issues its BO. The USFWS BO will specify when and under what conditions and/or prudent measures the action could proceed or whether the action will be allowed to proceed at all.

6) Williams and its contractors would prohibit project employees from having pet dogs on the HDEPA.

7) All suspected observations of black-footed ferrets, their sign, or carcasses on the HDEPA and the location of the suspected observation, however obtained, would be reported within 24 hours to:

Wildlife Biologist, BLM
(307) 328-4200
Rawlins Field Office
P.O. Box 2407
1300 North Third Street
Rawlins, WY 82301; and

Field Supervisor or Designee, USFWS
(307) 772-2374
Wyoming Field Office
4000 Airport Parkway
Cheyenne, WY 82001.

Observations would include a description including what was seen, time, date, exact location, and observer's name, address, and telephone number. Carcasses or other suspected ferret remains would be collected by the BLM or USFWS employees and deposited with the USFWS, Wyoming Field office.

Mountain Plover

1) Williams and its contractors would be shown how to identify mountain plover and would be provided information about its habitat requirements, natural history, status, threats, and possible impacts of gas development activities. Incidental observations of mountain plovers would be solicited from all field personnel.

2) During the period of May 1-June 15 throughout the LOP unless otherwise approved by the USFWS, mountain plover surveys would be conducted by the BLM or a Williams-financed BLM-approved biologist in accordance with existing or revised USFWS guidelines (USFWS 2001).

3) If an active nest and/or mountain plover are found within 0.25 mi of proposed facilities, informal conferencing would occur with the USFWS.

4) If an active nest is found in the survey area, planned activities would be delayed 37 days, or 1 week post-hatching, or if a brood of flightless chicks is observed, activities would be delayed at least 7 days.

5) Where access roads and/or well locations have been constructed prior to the mountain plover nesting season (April 10 - July 10) and use of these areas has not been initiated for development actions prior to April 10, a BLM-approved biologist would conduct surveys of these disturbed areas prior to use to determine whether mountain plover are present. In the event plover nesting is occurring, Williams would delay development activities until nesting is complete.

6) If nesting habitat is disturbed, these disturbed areas would be reclaimed to approximate original conditions (topography, vegetation, hydrology, etc.) after completion of activities in the area, in part to ensure suitable mountain plover breeding habitats are present on the reclaimed landscape. Seed mixes and application rates for reclamation in previously suitable mountain plover habitat would be designed to produce stands of sparse low-growing vegetation suitable for plover nesting, while meeting the BLM's requirements for stabilizing soil and controlling weeds. Reclamation would attempt to return the plant community to the pre-existing condition as soon as possible.

7) To minimize destruction of nests and disturbance to breeding plovers from construction and reclamation activities, grading, seeding, or other ground-disturbing activities would not occur from April 10 to July 10 unless surveys within 0.25 mi of project facilities (conducted using USFWS-approved methods) find that no plovers are nesting in the area.

8) All suspected observations of mountain plover adults, eggs, chicks, or carcasses on the HDEPA, however obtained, would be reported within 24 hours to:

Wildlife Biologist, BLM
(307) 328-4200
Rawlins Field Office
P.O. Box 2407
1300 North Third Street
Rawlins, WY 82301; and

Field Supervisor or Designee, USFWS
(307) 772-2374
Wyoming Field Office
4000 Airport Parkway
Cheyenne, WY 82001.

Observations would include a description including what was seen, time, date, exact location, and observer's name, address, and telephone number. Carcasses or other suspected plover remains would be collected by the BLM or USFWS employees and deposited with the USFWS, Wyoming Field Office.

2.1.13.17 Socioeconomics

Williams would implement hiring policies that encourage the use of local or regional workers.

2.1.13.18 Livestock/Grazing Management

Williams would coordinate project activities with ranching operations to minimize conflicts with livestock movement or other ranch operations and would maintain all fences, cattle guards, and other livestock-related structures required for their transportation network.

In areas of high livestock use, fencing of reclaimed areas would occur as necessary to ensure successful revegetation.

2.1.13.19 Land Status/Use

Roads, water and gas collection lines, and pipelines would be located adjacent to existing compatible linear facilities wherever practical.

All abandoned wells would be plugged utilizing BLM, WOGCC, and WDEQ procedures designed to protect subsurface aquifers; procedures may also include MSHA/WOGCC-approved techniques designed to facilitate future surface and subsurface coal mining operations at specific public land locations and in specific coal seams as deemed appropriate by the BLM.

Williams would secure an ROW on public lands from the BLM prior to facilities and pipeline construction or use of other areas and would notify authorized ROW users of any crossings or overlaps. Any associated river, creek, or utility crossing permits would be secured from the appropriate regulatory agency or private entity prior to facilities/pipeline construction.

Care would be used, including hand/shovel exposure where appropriate, for all facilities/pipeline construction work that parallels or crosses existing subsurface ROWs (e.g., pipelines, cables, power lines), and the minimum clearance between Williams's facilities/pipelines and existing features would be 12 inches unless a closer proximity is specifically authorized.

2.1.13.20 Recreation

BLM would encourage Williams to establish speed limits on project-related roads. Williams would inform their employees, contractors, and subcontractors that long-term camping (greater than 14 days) on federal lands or at federal recreation sites is prohibited.

2.1.13.21 Visual Resources

All surface facilities within the HDEPA would be designed to minimize disturbance and to conform to standards for the applicable Visual Resource Management (VRM) class (Class III

or IV). Facilities would be painted with standard environmental colors to blend with the surrounding landscape.

2.2 NO ACTION ALTERNATIVE

A No Action Alternative is considered in this NEPA document and provides a benchmark, enabling decision-makers to compare the magnitude of environmental effects of the alternatives. Under the No Action Alternative, the BLM would deny the proposal on federal lands in the HDEPA as currently proposed by Williams in the Proposed Action, while allowing existing land uses to continue. Denial of the current proposal is not, however, a denial of all natural gas development in the area. The decision of the BLM to deny an APD is not available without a No Surface Occupancy (NSO) stipulation in the lease; however, the BLM can impose "reasonable" mitigation measures on the lease if unnecessary or undue environmental degradation would occur. An oil and gas lease grants the lessee the "right to drill for . . . extract, remove, and dispose of all oil and gas deposits" from the leased lands, subject to the terms and conditions of the respective leases (BLM Form 3100-11). The denial of the right to develop a valid lease would violate the lessee's contractual rights, as well as result in the loss of federal royalties. Because the Secretary of the Interior has the authority and responsibility to protect the environment within federal oil and gas leases, restrictions are imposed on the lease terms. Although a given APD may be denied, the right to drill and develop somewhere on the leasehold may not be denied by the BLM. To deny all activity would constitute a breach of contract of an Operator's rights to conduct development activities on the leased lands. Authority for complete denial can be granted only by Congress (which can order the leases forfeited subject to compensation). The BLM, therefore, can only suspend the lease pursuant to Section 39 of the *Mineral Leasing Act* pending consultation with the Congress for a grant of authority to preclude drilling and provide compensation to the lessee.

For the purpose of this analysis, project development considered as components of the No Action Alternative are limited to the disturbances associated with the federal road ROW granted by BLM to Williams to in September 2001 to provide access to private land for the purposes of

developing private leases. On federal land, disturbance associated with these ROWs will be 23.7 acres initially and for the LOP (Table 2.1).

Under the No Action Alternative, development of the Proposed Action on federal lands would not be implemented (e.g., nine additional wells, the interconnect pipeline, and associated facilities would not be constructed), and other existing public and private land uses (e.g., CBM exploration, livestock grazing, wildlife habitat, and recreation) would continue in the HDEPA. No other development on federal lands is proposed, at this time, although, given the natural gas reserves potentially available within the Hanna Draw Federal Unit, projects to identify and potentially recover these resources are likely to be proposed in the future. If and when such projects are proposed, they would be analyzed in accordance with NEPA.

A No Action decision on the current proposal (i.e., a Finding of No Significant Impact [FONSI] is not made) would be considered if any of the following conditions are met:

1) there were no acceptable means of mitigating significant adverse impacts to stipulated surface resources values, which could trigger denial of leasing permits and ROW applications and would require consideration and analysis of other proposals/alternative(s); or
2) the USFWS concludes that the Proposed Action would likely jeopardize the continued existence of any TEP&C species, in which case the leasing permit and ROW application may be denied in whole or in part.

Under the No Action Alternative, site-specific NEPA analysis would be conducted for all development activities on federal land or mineral estate; however, the applicant-committed measures identified for the Proposed Action (Section 2.1.13) may not be implemented. Furthermore, additional developments on nonfederal land may occur. Existing disturbance from private land developments are summarized in Table 2.1.

2.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

Several other action alternatives were considered but were rejected for various reasons. One alternative would have re-injected the produced water. This alternative was rejected because the suitability of geological conditions for re-injection are presently unknown and because of the high costs associated with geologic evaluation and re-injection. In the event the pilot project proves to be successful, geological investigations to determine whether re-injection is feasible may be implemented.

A second alternative involved alternate numbers and locations of wells. This was rejected because the Proposed Action has the best well configuration for ensuring that a determination can be made from this exploration project regarding the commercial feasibility of coalbed methane development in the HDEPA.

A third alternative would have shortened the interconnect pipeline to about 8 mi in length, connecting it with the interstate pipeline immediately south of Hanna. This alternative was rejected due to the inadequate sales capacity of this particular pipeline.

An alternative interconnect pipeline route was considered as a fourth alternative. It was rejected because 1) the proposed 1-mi wide corridor includes enough routing alternatives to avoid most sensitive resources and 2) the proposed corridor is the shortest distance between the HDEPA and major interstate pipelines.

2.4 SUMMARY OF ENVIRONMENTAL IMPACTS

Table 2.4 presents a summary of the environmental impacts of the Proposed Action and the No Action Alternative. A detailed analysis of project impacts and mitigation measures is provided in Chapter 4.0.

Table 2.4 Summary of Environmental Consequences.

Resource	Proposed Action	No Action	Mitigation (Project-wide Environmental Practices and Protection Measures)
Climate	No impacts	No impacts	None
Air Quality	Temporary short-term construction-related increases in dust and exhaust emissions	Reduced to impacts caused by use of two existing roads	Dust suppression during construction; proper maintenance of construction equipment; prompt reclamation; WDEQ permit acquisition, as necessary
Topography and Physiography	Some LOP changes in topography due to cuts and fills	No impacts	Avoidance of steep slopes; proper reclamation
Geology and Geologic Hazards	No impacts	No impacts	Minimize disturbance or avoid sensitive areas; appropriate casing, plugging, and well abandonment procedures; prompt reclamation
Mineral Resources	Depletion of natural gas resources	Loss of federal mineral royalties	Efficient recovery of natural gas resources
Paleontology	Possible inadvertent destruction of fossils during construction	No impacts	Recovery during excavation of significant discoveries, as necessary
Soils	Disturbance of 162.7 acres of previously undisturbed soils	No impacts	Minimize disturbance; implement soil erosion practices until sites are permanently reclaimed; prompt stabilization and reclamation
Water Resources	No impacts to springs or seeps; pumping and disposal of ground water with increased metals and other constituents to the produced water containment reservoir; some increased runoff and sediment would likely reach local waterways	No impacts to springs or seeps; some increased runoff and sediment would likely reach local waterways	Avoid channel crossings; construction in channels during periods of no or low flow; prompt stabilization and reclamation; appropriate road and well location design and maintenance; proper disposal of produced water; adherence to Water Management Plan and NPDES permit requirements; WDEQ permit acquisition

Table 2.4 (Continued)

Resource	Proposed Action	No Action	Mitigation (Project-wide Environmental Practices and Protection Measures)
Noise and Odor	Temporary construction-related increases in noise; increased odors near wells and roads	Reduced to impacts caused by use of two existing roads	Properly muffle all construction equipment; avoid noise-sensitive areas at critical times
Vegetation, Wetlands, and Nonnative Invasive Species	Disturbance of 162.7 acres of previously undisturbed vegetation; potential for spread of nonnative invasive species on disturbed areas	No impacts to vegetation; potential for spread of nonnative invasive species from vehicular traffic on two existing roads	Minimize disturbance; noxious weed controls implemented; no disturbance to wetlands; prompt revegetation with native, adapted species
Wildlife and Fisheries	Direct effects from collision-related mortality; direct and indirect effects from 162.7 acres of temporary and 39.7 acres of LOP habitat loss; temporary displacement during construction; long-term displacement during operations	Direct effects of collision-related mortality	Comply with all seasonal stipulations and applicant-committed measures for wildlife protection unless otherwise authorized by the BLM; minimize disturbance; prompt reclamation
Threatened, Endangered, Proposed and Candidate, (TEP&C) Species, and Sensitive Animal and Plant Species	Not likely to adversely impact black-footed ferret; may cause loss of potential mountain plover breeding, nesting, and foraging habitat; no impacts to downstream species in the North Platte River	Same as Proposed Action, except no additional loss of mountain plover habitat	Complete surveys prior to construction; avoid species habitats where practical; adherence to BA requirements (Appendix D) and those specified in the USFWS Biological Opinion
Cultural Resources	Some unidentified sites and artifacts may be disturbed or destroyed	No impacts	Complete surveys of all areas to be disturbed; avoid NRHP-eligible sites where practical; mitigate possible impacts on a case-by-case basis through the NHPA Section 106 consultation process

Table 2.4 (Continued)

Resource	Proposed Action	No Action	Mitigation (Project-wide Environmental Practices and Protection Measures)
Socioeconomics/ Environmental Justice	Temporary beneficial economic impacts to local and state economies during construction; long-term benefits due to increased product availability; no impacts to environmental justice	Loss of positive economic benefits	Hire workers locally as available
Landownership and Use	No change in landownership; temporary loss of grazing land, wildlife habitat, and recreation	No impacts	Prompt stabilization after construction and reclamation of disturbed areas
Aesthetic and Visual Resources	Temporary visual impacts during construction; no long-term impacts requiring re-categorization of existing VRM classification	Impacts reduced to those related to use of two existing roads	Minimize disturbance; prompt stabilization and reclamation of disturbed areas; painting and locating aboveground features to blend with the surrounding landscape and taking other necessary measures to avoid visual impacts
Hazardous Materials	Possible spills	Same as Proposed Action but reduced to the use of two existing roads	Implementation of appropriate spill prevention and control measures

3.0 AFFECTED ENVIRONMENT

This chapter describes the existing condition of the physical, biological, cultural, and socioeconomic resources of the HDEPA. The resources addressed herein were identified during the internal and public scoping processes as having the potential to be affected by project-related activities. Critical elements of the human environment (BLM 1988a), their status in the HDEPA, and their potential to be affected by the proposed project are listed in Table 3.1. Five critical elements (areas of critical environmental concern [ACEC], environmental justice [minority and/or low-income populations], prime or unique farmlands, wild and scenic rivers, and wilderness) are not present in the HDEPA; therefore, these five elements are not addressed further in this EA. In addition to the nine remaining critical elements, this EA also discusses topography and physiography; geology and geological hazards; mineral resources; paleontological resources; soils; noise and odor; vegetation; wildlife and fisheries; socioeconomics; land use (including livestock/grazing management and recreation); and aesthetic and visual resources. Wild horses do not occur on the HDEPA and are not discussed in this document.

3.1 PHYSICAL RESOURCES

3.1.1 Climate and Air Quality

The HDEPA is located in a semiarid, steppe (dry and cold), midcontinental climate regime typified by dry windy conditions, limited rainfall, and long cold winters. The average annual temperature is approximately 42°F (Western Regional Climate Center [WRCC] 2000a, 2000b), and monthly mean temperatures range from a low of 11°F in January to a high of 83°F in July. The average annual precipitation is approximately 10 inches, with the majority falling from April to October; 30% occurs from thunderstorms during the summer months of June through August (Martner 1986). The average annual snowfall is approximately 39 inches, with January being the month of greatest accumulation (WRCC 2000a, 2000b). Snow accumulation patterns are determined by the effects of topography and vegetation on windblown snow and have a marked effect on vegetation, wildlife, hydrology, and human activities. Annual pan evaporation rate is an estimated 60 inches, while reservoir evaporation, representing anticipated conditions is approximately 42 inches (see Appendix B).

Table 3.1 Critical Elements of the Human Environment.[1]

Element	Status on the HDEPA	Addressed in Text of EA
Air Quality	Potentially affected	Yes
Areas of critical environmental concern	None present	No
Cultural resources	Potentially affected	Yes
Environmental justice	None present	No
Farmlands, prime or unique	None present	No
Floodplains	Potentially affected	Yes
Native American religious concerns	Potentially affected	Yes
Nonnative invasive species	Potentially affected	Yes
Threatened and endangered species	Potentially affected	Yes
Wastes, hazardous or solid	Potentially affected	Yes
Water quality (surface and ground water)	Potentially affected	Yes
Wetlands/riparian zones	Potentially affected	Yes
Wild and scenic rivers	None present	No
Wilderness	None present	No

[1] As listed in BLM *National Environmental Policy Act Handbook H-1790-1* (BLM 1988a) and subsequent Executive Orders.

The HDEPA is located in a region of Wyoming known as the wind corridor, where cold wind from the west and southwest is channeled eastward across the Continental Divide (Martner 1981). Annual wind speeds average 4.5-21.5 mph and are greater during the afternoon and in the winter. The wind corridor has some of the strongest and most persistent winds in the U.S. (Martner 1986). There would be no impacts to climate from the proposed project, and it is not discussed further in this EA.

Air quality in the region is generally good (BLM 1995a, 1995b). Management for air quality includes the prevention of deterioration of air quality beyond applicable local, state, or federal

standards; the enhancement of air resources of high quality where practicable; and the preservation of scenic values that may be impaired by the release of total suspended particulates (TSP) or other contaminants into the air that would adversely affect visibility (BLM 1988b:60).

The HDEPA is in the Hanna Basin and is part of the Laramie Air Basin (BLM 1987:167-168), which includes much of south-central Wyoming. The basin is bordered by the Wyoming-Colorado state line to the south, the Laramie Mountains to the east, the Granite Mountains to the North, and the Great Divide Basin to the west. Air transport from the west and southwest dominates in level terrain areas, and dispersion results from unstable conditions induced by surface heating during the day. Stable conditions may be expected at night as the earth cools. In areas with significant terrain features such as the Medicine Bow, Shirley, and Green Mountains, transport is more complex. Typical mountain-valley coupling effects are evident in these areas, along with significant diurnal variations in local winds (BLM 1987:167).

The HDEPA is in an area designated a Prevention of Significant Deterioration (PSD) Class II area under the WDEQ/AQD Implementation Plan (BLM 1987:154-169). PSD Class II areas are those that may be developed, and the release of limited concentrations of certain pollutants over Class II PSD increments is permitted so long as NAAQS are maintained and emissions are within the PSD Class II increment (WDEQ 2000). The nearest PSD Class I area (an area where little air quality deterioration is allowed) is the Savage Run Wilderness, approximately 50 mi south-southeast of the HDEPA. Although the Savage Run Wilderness has not been designated Class I by Congress and thus legally does not have to be managed as a Class I area, it has the legal requirement to be managed as a Class I area under the *Wyoming Air Quality Standards and Regulations* Chapter 6, Section 4(c) (personal communication, May 2001, with Darla Potter, WDEQ). Other Class I areas in the region include the Bridger Wilderness in Wyoming and the Mount Zirkel Wilderness in Colorado.

The *Clean Air Act* mandates that NAAQS, established by the EPA, must be maintained nationwide. NAAQS include standards for six "criteria" pollutants: ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), respirable particulates (PM_{10}), sulfur dioxide (SO_2), and

lead (Pb). Carbon County, Wyoming, is in an attainment area for all NAAQS "criteria" pollutants.

Visibility in the region is very good (generally greater than 70 mi), and particulates--fine particles carried by the wind from natural or manmade sources--are considered to be the main source of visibility degradation (BLM 1998a). Climatic factors such as prevailing winds, atmospheric stability, and mixing heights affect air quality by influencing the ability of air to disperse or dilute particulates and other pollutants. Unstable conditions caused by vertical movement of air heated near the ground during the day combined with moderate to high wind speeds provide conditions conducive to dispersing and diluting particulates and other pollutants and maintaining air quality (BLM 1987). These conditions occur more than 70% of the time throughout most of the region in which the HDEPA occurs.

3.1.2 Topography and Physiography

Situated along a series of low rises trending north-northeast by south-southwest, the exploration area lies roughly 7 mi north-northeast of the town of Hanna, southeast of Seminoe Reservoir, south of the Shirley Mountains, and southwest of the Freezeout Mountains. Elevation ranges from approximately 6,800 to 7,000 ft above sea level. The proposed pipeline corridor traverses the western flanks of Ridge No. 5 and Simpson Ridge at elevations ranging from 6,700 to 7,300 ft.

3.1.3 Geology and Geological Hazards

3.1.3.1 Geology

Coals in the Tertiary Hanna Formation are the source for CBM in the exploration area. The Hanna Formation crops out throughout the exploration are and may be greater than 11,000 ft thick (personal communication, December 29, 1992, with Jason Lillegraven, Professor, University of Wyoming [UW]) (Figure 3.1). It is composed of lenticular, discontinuous

Figure 3.1 Surface Geology.

alternating beds of variously colored shales, massive to cross-bedded calcareous sandstones, thin lenses of conglomerate (Knight 1961; Richter 1981), and at least 32 coal seams greater than 5 ft thick (Glass and Roberts 1980). The structural axis of the asymmetrical syncline that formed the Hanna Basin crosses the HDEPA.

Quaternary alluvium and colluvium crop out along the Medicine Bow River in the northern portion of the HDEPA (Love and Christensen 1985). No other formations occur in the exploration area. The pipeline corridor crosses the Ferris, Medicine Bow, and Mesaverde Formations and the Lewis Shale.

The Hanna Basin and neighboring basins and mountains were formed during the Laramide orogeny, a complex period of deposition and intense deformation (i.e., folding, faulting, or mountain-building) that formed the Rocky Mountains (Knight 1961; Richter 1981). The sedimentary rocks that make up the Hanna Formation within the Hanna Basin are moderately folded with minor faults having vertical displacements of up to 200 ft (Glass and Roberts 1980). The majority of the faults in the HDEPA have displacements of less than 50 ft (personal communications, March 25, 1992, with Rod Bernasek, Consulting Geologist, and with Clark Ditzler, Vice President, Exploration, MetFuel) (Richter 1981); however, fault displacement (along one or more splays of the Shirley Thrust) of several thousand feet along the northern boundary of the HDEPA have been noted (personal communication, December 29, 1992, with Jason Lillegraven, Professor, UW). Hanson and Schug (1979) showed that some geologic units of the Hanna Formation may be correlated across small areas.

3.1.3.2 Mineral/Oil and Gas Resources

Coal and CBM gas are the principal fossil fuel resources in the HDEPA. Chapter 2.0 describes the resource recovery potential for CBM in the HDEPA.

Coal. Coals in the Hanna Formation occur throughout the Hanna Basin. These coals are nonmarine strata and were deposited during the Laramide orogeny between 66 million and 58 million years ago and are generally ranked subbituminous C to high-volatile C bituminous.

The Hanna Basin Coalfield in-place coal resources are estimated at 23.3 billion tons and are valued at approximately $6.7 billion; however, no currently economically producible coals occur within the exploration area, and the subject is not discussed further in this EA.

Underground and surface coal mining has occurred in the Hanna Basin since the 1860s (Figure 3.2). Prior to 1979, 189.6 million tons of coal were mined from the Hanna coalfield (Glass and Roberts 1980)--109.9 million tons from underground mining and 79.7 million tons from surface mining. In 1980, six companies were mining coal in the Hanna field at a rate of 15 million tons per year. Currently, there are six active surface coal mines in the Hanna Basin, four of which are undergoing final reclamation. The underground Shoshone coal mine ceased mining in December 2000 and is currently reclaiming surface disturbances.

Additionally, two historical underground coal mines in the HDEPA produced minor quantities of coal prior to abandonment (personal communication, March 6, 1992, with Richard Jones, Wyoming Geological Survey). The Rock Crossing Mine, located in Section 33, T24N, R81W, probably mined Hanna Coal Number 88 and was abandoned in 1906. The Coulter Mine, in Section 35, T24N, R81W, mined Hanna Coal Number 89. No coal was produced from two state leases in the HDEPA (lease numbers 0-21609, Section 36, T24N, R81W; and 0-30571; Section 36, T24N, R82W) (personal communications, March 6, 1992, with Donna Glissman, Secretary, WDEQ-LQD, and March 10, 1992, with Deborah Johnson, Audit Technician, Wyoming Public Lands).

Gas and Oil. Previous attempts at gas development in the Hanna Basin have been unsuccessful. Several holes (Sections 4 and 10, T23N, R81W, and Section 27, T24N, R81W), presumed to be exploration gas wells, have been drilled, but no gas was produced (personal communication, February 28, 1992, with Cheryl Volk, Clerical Specialist, WOGCC). In the early 1990s, MetFuel Wyoming Inc. proposed full field development in largely the same location as the Hanna Draw Federal Unit (BLM 1993), but the project was never developed. Nine CBM wells are currently completed in the exploratory area, all of which occur on private land. No oil exploration or development has occurred in the HDEPA.

Figure 3.2 Location of Local Surface and Underground Coal Mines.

Locatable Minerals. Federal minerals, except those specifically available through lease or sale, are available by location under the *General Mining Law of 1872*. No locatable minerals (e.g., iron, copper, gold, asbestos, jade) are known to occur within the HDEPA (BLM 1987:126); therefore, locatable minerals are not discussed further in this EA.

Saleable Minerals. The *Materials Act of 1947*, as amended (30 *United States Code* [U.S.C.] 601 et seq.), and promulgating regulations found in Title 43 C.F.R., Part 3610, govern federal minerals such as sand, stone, gravel, and rock and authorized the BLM to sell federal mineral materials at fair market value. Sand and gravel deposits, consisting of alluvium and colluvium, may be found along the Medicine Bow River or in alluvial fans or terraces in the HDEPA (BLM 1987:127). The Hanna Formation is a known source of scoria deposits that have been mined at adjacent coal mines, but no scoria is presently being mined in the HDEPA. No saleable mineral permits have been issued within the HDEPA, and there are no other known local occurrences of mineral resources in the vicinity, so saleable minerals are not discussed further in this EA.

3.1.3.3 Geological Hazards

No known or suspected active faults occur in the area (Case 1990; Case et al. 1990). Potential for seismicity is as follows: a hypothetical earthquake which could 1) cause negligible damage to "well-designed structures and well-built structures, slight to moderate damage in well-built ordinary structures, and considerable damage in poorly built structures" or 2) cause slight damage in “specially designed structures, considerable damage in ordinary buildings with partial collapse, and great damage in poorly built structures" (Case 1994).

Earthquake damage is caused primarily by ground motion from seismic waves traveling through the earth. The earthquake damage described would likely result from ground acceleration values (a measure of potential ground motion) of 10 to 30 (expressed as percent of gravity). In the HDEPA, there is a 2% chance that in 1 in 50 years an earthquake would cause ground acceleration to exceed 16 to 20 and thus cause damage equal to or greater than that described above. This type of earthquake has a probability of occurring once in 2,500 years. About once

every 500 years, an earthquake may occur which would do more than crack plaster or cause it to fall and cause damage to chimneys.

An earthquake with an epicenter in the Como area (approximately 5 mi to the east-southeast) occurred in 1973 (Case 1986), and two earthquakes with intensities of III and IV on the modified Mercali scale occurred near Medicine Bow (approximately 20 mi to the east) in 1938 and 1952. (Intensity, as measured on the modified Mercali scale, is a qualitative estimate of the perceived amount of ground-shaking.) Earthquakes with intensities of III and IV are noticeable indoors but only barely, if at all, noticeable outdoors. The Seminoe Reservoir area in the northern part of the Hanna Basin experienced five earthquakes with magnitudes of 2.9-3.1 on the Richter scale between 1989 and 1993 (Case 1990, 1994). (The Richter scale is a quantitative measure of the magnitude of an earthquake--the relative amplitude of ground motion caused by seismic waves. Magnitudes of 2.9-3.1 are relatively small.)

Subsidence of abandoned underground coal mines (i.e., Rock Crossing Mine, Coulter Mine) is a very minor potential hazard in the HDEPA. No subsidence has been observed at these mines, and the potential for subsidence is low due to small mine size (personal communication, March 6, 1992, with Richard Jones, Wyoming Geological Survey). At small mines, minor subsidence is most frequently observed at or adjacent to the mine mouth. The large Shoshone underground mine partially underlies the Hanna Draw Federal Unit (Figure 3.2). It does not underlie any area proposed for exploration or pipeline construction, but a portion of the Hanna Draw Road used to access the HDEPA intersects the Shoshone Mine permit area.

Windblown deposits occur in Sections 11 and 12, T23N, R81W, in the exploration area and in isolated patches along the proposed pipeline corridor (personal communication, June 2001, with Jim Case, Wyoming State Geological Survey). Windblown deposits in the exploration area are associated with playas. Along the pipeline, they occur in mixed deposits with alluvium and rock.

The only known landslides in the HDEPA occur along the western flank of Simpson Ridge adjacent to the proposed pipeline corridor (personal communication, June 2001, with Jim Case, Wyoming State Geological Survey). These are classified as slump/flow complexes.

Flood Insurance Rate Maps or Flood Hazard Boundary Maps have not been developed for the HDEPA, so the HDEPA is classified as Zone D (areas of undetermined but possible flood hazard). There is potential for flooding along the dry washes and the ephemeral and perennial streams in the HDEPA. The largest floodplain occurs along the Medicine Bow River in the northern portion of the HDEPA. Smaller floodplains occur along some of the creeks and washes throughout the HDEPA. Flooding in ephemeral drainages is generally in response to high-intensity (large quantity per unit of time) localized storms. Such storms cause most of the floodwater damage, surface erosion, arroyo formation, and sediment deposition in arid and semi-arid environments (Branson et al. 1981). Martner (1986) indicated an average of 40 thunderstorms per year in the vicinity.

No other known geologic hazards occur within the project area.

3.1.4 Paleontological Resources

Geologic mapping documents four sedimentary deposits exposed at the surface in the HDEPA (Love and Christensen 1985; Love et al. 1993; Lillegraven and Snoke 1996). These include, from youngest to oldest: 1) unnamed deposits of late Holocene age, including unconsolidated aeolian sands, stream gravels, alluvium, and colluvium; 2) Hanna Formation of Paleocene and possibly earliest Eocene age; 3) Ferris Formation of late Cretaceous and Paleocene age; and 4) Medicine Bow Formation of Late Cretaceous age.

With the exception of the Holocene deposits that are probably too young to contain fossils, these sedimentary rock units have produced scientifically significant fossils vertebrate resources in areas immediately adjacent to the Hanna Draw area and for that reason are classified as satisfying BLM Paleontology Condition 2 (H8270-1 General Guidance for Paleontological Resource Management) (Table 3.2) (Winterfeld 2001). Condition 2 may trigger formal analysis of existing data prior to authorizing land use actions involving surface disturbance.

Fossil vertebrates in areas surrounding the HDEPA document the history of animal and plant life in Wyoming during the latest part of the Mesozoic and earliest part of the Cenozoic Era. Most

Table 3.2 Summary of Surface Geologic Deposits and Paleontologic Resources Hanna Draw CBM Area.

Geologic Deposit	Geologic Age	Type of Deposit/ Environment of Deposition	Fossil Resources	BLM Paleontologic Condition[1]	Area Present
Alluvial sediments (alluvium and colluvium)	Holocene	Unconsolidated silts, sands of valleys and plains; terrestrial-fluvial	None	3	Widespread
Terrace deposits	Pleistocene	Gravels, silts and sands that predate current erosional cycle; terrestrial-fluvial	None	3	Scattered along modern river and stream drainages
Hanna Formation	Paleocene	Sands, silts, coals, shales, conglomerate; terrestrial-fluvial, lacustrine, swamp	Vertebrates, invertebrates, plants	2	Exploration area, pipeline corridor
Ferris Formation	Latest Cretaceous to Paleocene	Sands, silts, shales, rare coals, conglomerates; terrestrial-fluvial, alluvial fan	Vertebrates, invertebrates, plants	2	Pipeline corridor, south of Highway 287/30
Medicine Bow Formation	Latest Cretaceous	Sands, silts, coals, shales; marine-estuarine, brackish, deltaic, terrestrial-fluvial	Vertebrates, invertebrates, plants	2	Pipeline corridor, south of Highway 287/30
Lewis Shale	Latest Cretaceous	Sands, silts, shales; marine shoreline, nearshore, offshore	Vertebrates, invertebrates, trace fossils	2	Pipeline corridor, along Highway 72

[1] See text for explanation.

importantly, these deposits preserve strata containing the Cretaceous-Tertiary boundary, which dates to the time of the extinction of the dinosaurs and adaptive radiation of mammals, and the Paleocene-Eocene boundary, which dates to the transition from archaic to modern orders of mammals (Winterfeld 2001).

BLM paleontology conditions are the basis for establishing the paleontologic potential of surface geologic formations and in determining the need for additional consideration. These categories, include the following.

Condition 1. Areas that are known to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. Consideration of paleontological resources will be necessary if the

BLM field office review of available information indicates that such fossils are present in the area.

Condition 2. Areas with exposures of geological units or settings that have high potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. The presence of geologic units from which such fossils have been recovered elsewhere may require further assessment of these same units where they are exposed in the area of consideration.

Condition 3. Areas that are unlikely to produce vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils based on their surficial geology, igneous or metamorphic rocks, extremely young alluvium, colluvium, or aeolian deposits or the presence of deep soils. However, if possible, it should be noted at what depth bedrock may be expected in order to determine if fossiliferous deposits may be uncovered during surface-disturbing activities.

Search of the locality records of the paleontologic collections housed at the Department of Geology and Geophysics at UW revealed no designated fossil localities within the HDEPA (personal communication, June 2001, with Jason Lillegraven, UW). No other museums were contacted because field parties from UW have been the only group to conduct paleontologic research in the Hanna Basin in recent times.

The Hanna, Ferris, and Medicine Bow Formations and Lewis Shale, however, are known to produce vertebrate fossils of scientific significance in areas adjacent to the HDEPA. For that reason, these formations satisfy BLM Paleontologic Condition 2.

The Hanna Formation produces the remains of terrestrial and aquatic vertebrates, invertebrates, and plants of Paleocene to possibly earliest Eocene age (Gill et al. 1970; Ryan 1977; Lillegraven 1995; Eberle and Lillegraven 1998a). Plants from the formation include microfossil (pollen) and megafossil (leaf and stem imprints and petrified and carbonized wood) remains. Prior to the 1970s, the only vertebrate fossils reported from the Hanna Formation were those mentioned by Bowen (1918), who reported on the sparse occurrence of fish scales, turtle fragments, and the fragmentary jaw of the condylarth genus Claenodon. During the late 1970s, Lillegraven and

Eaton discovered a lower jaw of the phenacodont condylarth genus Tetraclaenodon. More recent work completed in the 1990s by UW field parties documented fossil vertebrates including a wide variety of mammals, reptiles, and fish of Paleocene age. In addition, a specimen of early horse, Hyracotherium, was discovered from near the top of the unit that suggests the top of the Hanna Formation is earliest Eocene in age (Eberle and Lillegraven 1998a, 1998b).

In the Carbon Basin (approximately 16 mi southeast of the exploration area), the Hanna Formation has produced the remains of 33 mammalian species comprising seven orders and 16 families that are middle to late Paleocene in age (Secord 1998). Although fish fossils are known from the Hanna Formation within the boundaries of the Hanna Draw Federal Unit, they are of no special importance scientifically (personal communication, June 2001, with Jason Lillegraven, UW). In addition, no terrestrial vertebrates have been found in the exploration area. The pipeline corridor, however, crosses several fossil-bearing formations and is known to have produced fragmentary fossils.

The Ferris Formation has produced fossils ranging in age from Latest Cretaceous to Early Paleocene age. The Ferris Formation has produced scientifically significant fossil vertebrates, including the remains of 59 species of early Paleocene (Puercan) mammals (Eberle and Lillegraven 1998a, 1998b; Eberle 1996). The vertebrate fauna of the Ferris is of particular importance because it spans the Cretaceous-Tertiary boundary and provides critical information on the diversification of mammals at the beginning of the Cenozoic Era. In addition, the formation preserves fossil leaves and shells of freshwater invertebrates and trace fossils.

The Medicine Bow Formation has produced the remains of terrestrial vertebrates and plants and marine and freshwater invertebrates. Plants known from the formation include microfossil (pollen) and megafossil (leaf and stem imprints, and petrified and carbonized wood) remains. Well-preserved fossil leaf floras have been described from the formation by Dorf (1942). Invertebrate fossils include marine foraminifera and brackish water gastropods and bivalves, represented by at least 21 species (Gill et al. 1970; Fox 1971). Dinosaur bone fragments from the ceratopsian Triceratops have long been known from the lower part of the formation (Bowen 1918; Lull 1933; Breithaupt 1985, 1994), and the formation has also produced the remains of

a small number of mammals of Lancian (Latest Cretaceous) age (Lillegraven 1993, 1995; Secord 1998). The lower part of the Medicine Bow Formation has little potential for vertebrate fossils because of its marine nature (personal communication, June 2001, with Jason Lillegraven, UW).

The Lewis Shale is known to preserve a variety of marine invertebrate fossils, including many genera of bivalves, baculites, scaphites, and ammonites. Isurid shark teeth have also been recovered from the formation at localities in Carbon County (Breithaupt 1985). The Fox Hills Sandstone, which is often lumped with the Lewis because it is too thin to map separately on smaller scale maps, is known to preserve shallow-water marine invertebrate fossils, including a large variety of clams and snails, three distinctive types of ammonites, a species of bryozoan, and trace fossil Ophiomorpha burrows. The remains of marine fish--sharks, rays, and bony fish--and marine crocodiles and lizards (mosasaurs) have been reported from localities in the Fox Hills Sandstone in Sweetwater and Converse Counties in Wyoming (Winterfeld 1978; Breithaupt 1985).

3.1.5 Soils

Soils within the HDEPA have been preliminarily mapped by the Natural Resources Conservation Service (NRCS). Available maps show 19 major soil mapping units in the HDEPA (Table 3.3). Soils are extremely variable and may be clayey, sandy, or loamy; deep or very shallow; saline or neutral; and poorly drained or well drained. The 19 soil units can be grouped into four major types based on topographic positions: upland soils (i.e., soils on uplands, pediments, high alluvial fans, or high river terraces); bottomland and stream terrace soils (i.e., soils on streambanks or low alluvial fans); dissected upland soils (i.e., soils on dissected uplands or at rock outcrops); and playa soils (NRCS 2001).

Soil depths in the upland soils ranges from 0 to more than 87 inches. Slopes are typically 0 to 6%. Water erosion hazard is slight or moderate, and wind erosion is moderate to severe. Shallow depths, low permeability, and alkalinity are other limitations to development and/or productivity on these soils.

Table 3.3 Soil Characteristics.

Table 3.3 Soil Characteristics.[1]

Mapping Unit	Depth to Bedrock (inches)	Slope (%)	Permeability	Water Erosion Hazard	Soil Blowing Hazard	Limitations	Limitations for Road Construction
Uplands, Pediments, High Alluvial Fans, High River Terraces							
253 - Blazon-Cushool Association [2, 3]	14-35	0-6	Moderate	Slight to moderate	Moderate to severe	Shallow	Moderate to severe: depth to rock
254 - Abston-Seaverson complex[2]	14-32	0-6	Low	Slight	Severe	Severe wind erosion hazard, alkalinity, shallow	Severe: excess sodium, depth to rock
Streambanks, Floodplains, Low Alluvial Fans							
210 - Absher Variant very fine sandy loam [2, 3]	≥87	--	Low	Moderate	Severe	Severe wind erosion hazard, alkalinity, clay	Severe: excess sodium
257 - Havre Variant - Glendive Variant complex [2]	≥63	0-3	Moderate to moderately rapid	Moderate	Moderate to severe	Moderate to severe wind erosion hazard, flooding	Slight
Dissected Uplands, Cuestas, Rock Outcrops							
235 - Blaxon complex [2, 3]	13	6-40	Moderate	Severe	Moderate	Severe water erosion hazard	Severe: slope
252 - Blazon-Rentsac complex [2, 3]	10-14	10-50	Moderate	Severe	Moderate	Moderate wind erosion hazard, severe water erosion hazard, shallow	Severe: slope, depth to rock
401 - Torriorthents/Rock Outcrop [2, 3]	0-n.a.	30-60	--	--	--	--	Severe: depth to rock
1203 - Rentsac-Shinbara/ Rock Outcrop [3]	0-20	--	Moderate to rapid	Severe	Moderate	Moderate wind erosion hazard, severe water erosion hazard, shallow	--

Table 3.3 (Continued)

Mapping Unit	Depth to Bedrock (inches)	Slope (%)	Permeability	Water Erosion Hazard	Soil Blowing Hazard	Limitations	Limitations for Road Construction
Playas							
255 - Playa [2]	--	0	--	--	--	Salinity, severe wind erosion hazard	--
258 - Rock River-Cushool Complex [3]	20->60	0-12	Moderate	Slight	Severe	Shallow, severe wind erosion hazard	--
38A - Rock River sandy loam [3]	>60	2-6	Moderate	Slight	Severe	Severe wind erosion hazard	--
236 - Cushool-Worfman-Blackhall Complex	6-40	2-20	Moderate to moderately rapid	Slight to severe	Severe	Shallow, severe wind erosion hazard	--
931-Forelle [3]	>60	0-6	Moderate	Slight to moderate	Severe	Severe wind erosion hazard	--
245 - n/a [4]	--	--	--	--	--	--	--
13B - Rhoamett silty clay [3]	>60	0-2	Low	Slight	Slight	Shrink-swell, low strength, alkalinity	--
264 - Rentsac channery loam [3]	10-20	5-50	Moderately rapid	Moderate	Slight	Shallow, slope	Severe: depth to rock, slope
208 - Pinelli-Forelle Complex [3]	>60	3-15	Moderately slow to moderate	Slight to moderate	Moderate	Shrink-swell, low strength, wind and water erosion hazard	--
261 - Luhon - Rock River Association [3]	>60	0-10	Moderate	Slight to moderate	Moderate to severe	Severe wind erosion hazard	--
51WA - Patent Variant very fine sandy loam[3]	>60	0-3	Moderate	Moderate	Moderate	None	--

[1] Source: NRCS (unpublished data).
[2] Occurs in proposed drilling area.
[3] Occurs along proposed pipeline corridor.
[4] No information available from the NRCS.

Bottomland and stream terrace soils occur along stream channels, floodplains, and low alluvial fans adjacent to stream channels. Slopes are typically 0 to 3%. The potential for water erosion is slight to moderate except along stream channels where active channel cutting may be occurring. The soil blowing hazard is moderate to severe. Other factors that may potentially limit development or productivity include alkalinity, high clay content, low permeability, and flooding (NRCS 2001).

Soils on dissected uplands are very shallow (typically less than 20 inches deep if soil is even present at all) and often are actively eroding. Bedrock frequently crops out, and soil development may be limited. Water erosion and soil blowing hazards are slight to severe (Table 3.3) (NRCS 2001).

Two playas occur in Section 12 in the exploration area. Slopes are near 0%. Productivity may be limited by high salinity (BLM 1993).

Most soils in the HDEPA are used for livestock grazing and wildlife habitat. Productivity varies depending on numerous factors, such as soil depth, texture, topographic slope, slope aspect, and permeability. Bottomland and stream terrace soils are most productive with an average of 500 to 3,000 lbs air-dried vegetation per acre per year. Upland soil productivity ranges from 400 to 1,600 lbs per acre of air-dried vegetation on lands in excellent condition. Dissected upland soil productivity is unknown but is probably relatively low. Playa productivity may be relatively high if salinity is not a limiting factor, but if salinity is a factor, the productivity would be low (NRCS 2001).

3.1.6 Water Resources

3.1.6.1 Surface Water

The exploration area and the proposed pipeline corridor lie within the North Platte River drainage basin (BLM 1987). Surface drainage in the vicinity is generally toward the Medicine Bow River, a perennial river that may experience periods of very low flow, especially during fall

and winter uses (Figure 3.3) (U.S. Geological Survey [USGS] 1994). The Medicine Bow River derives most of its flow from snowmelt and, to a lesser extent, from ground water inflow and occasional thunderstorms. For the 54-year period between 1940 and 1993, mean daily flow in the Medicine Bow River near Hanna was typically less than 20 cfs but ranged from 12 to 3,059 cfs. Flows were highest during May-June and lowest in September and January (USGS 1994). Several springs occur along the pipeline corridor, but none occur in the exploration area.

Surface water quality in the area is fair. The Medicine Bow River is a Class 2 water (WDEQ 1990), which are waters other than Class 1 waters that presently support or have the potential to support game fish or include nursery areas or food sources to support game fish. The Medicine Bow River supports a cold-water fishery as well (BLM 1990c). The pH is neutral to slightly alkaline, sulfates average approximately 500 mg/l, and chlorides range from 12 to 42 mg/l (Table 3.4). Total dissolved solids (TDS) may exceed 1,000 mg/l. Radium levels are low, averaging 0.25 picocuries/l. Water quality in the Medicine Bow River for all major surface water (i.e., livestock and wildlife watering, industry, primary contact recreation [swimming], irrigation, and human health value criteria [Gumtow 1994]) uses is unassessed (WDEQ 1998). All other streams within the HDEPA are Class 4 waters (WDEQ 1990), which do not have the hydrologic or natural water quality potential to support fish. Class 4 waters are protected for agriculture and wildlife watering uses. Levels of sulfates (1,242 mg/l) and TDS (2,023 mg/l) in Hanna Draw are high (Table 3.4), while pH is neutral to alkaline, and chloride levels average 28 mg/l. Radium-226 levels have not been measured.

Human health value criteria are a suite of water quality standards, and waters that meet or exceed these standards are classified as supporting human health value criteria and suitable for human use.

The exploration area is internally drained or drains to the northwest via an unnamed draw into Hanna Draw. The pipeline route would cross an estimated 13 ephemeral channels. The southern end of the pipeline drains to the west, generally into small basins with no outlet. At the northern

Figure 3.3 Surface Water Drainage.

Table 3.4 Surface Water Quality, Medicine Bow River and the Hanna Draw.[1]

	Medicine Bow River[3]			Hanna Draw[2]		
Water Quality Parameter[2]	Average	Standard Deviation	n[4]	Average	Standard Deviation	n[4]
Calcium (mg/l)	114.80	46.13	13	223.70	86.09	13
Chloride (mg/l)	26.92	14.67	13	29.38	38.70	13
Magnesium (mg/l)	50.30	22.80	13	159.60	74.13	13
pH (s.u.)	8.20	0.16	7	7.97	0.54	13
Potassium (mg/l)	4.73	2.86	13	8.50	1.79	13
Radium-226 (pCi/l)	0.25	0.04	4	--	--	--
Sodium (mg/l)	89.50	38.73	13	188.60	91.99	13
Sodium absorption ratio	1.73	0.42	13	2.23	0.76	13
Sulfate (mg/l)	495.30	231.40	13	1242.00	590.60	13
Total alkalinity (mg/l)	133.00	23.25	10	232.00	73.04	5
TDS (mg/l)	877.30	361.90	13	2023.00	901.50	13
Total hardness (mg/l)	496.10	210.90	13	1208.00	510.30	13

1 Source: Wyoming Water Research Center (1992).
2 µg = micrograms; mg = milligrams; pCi = picocuries, l = liters; µmhos = micromhos; s.u.= standard units.
3 Gauging station locations:
Medicine Bow River: SE¼ NW¼, Section 34, T24N, R81W
Hanna Draw: SW¼ NE¼, Section 34, T24N, R81W
4 Number of samples.

end of the pipeline route, drainage is northeast into Pine Draw, which is a tributary of the Medicine Bow River. The central pipeline corridor flows into Carbon Creek, which drains into Allen Lake and has no outlet.

3.1.6.2 Ground Water

Ground water within the HDEPA occurs in confined (artesian), semi-confined, and unconfined (water table) aquifers (Daddow 1986). Ground water is contained primarily in the sandstone and coal aquifers of the Hanna Formation in a complex array of rocks and geologic structures. The Hanna Formation is the uppermost member of the hydrologic unit, defined by Lowry et al.

(1983) and Richter (1981), which also includes the Ferris and Medicine Bow Formations, Fox Hills Sandstone, Lewis Shale, and the Mesaverde Group. The Hanna Formation and the minor alluvial and colluvial aquifers that occur along the HDEPA streams are on the only aquifers that would be affected by the proposed project.

Data obtained from the producing wells indicate that the radius of influence of the producing wells is small, as evidenced by the absence of observable well to well interactions (personal communication, August 2001, with Duane Zavadil, Williams).

The principal water-bearing units in the Hanna Formation are thin (5 to 60 ft) locally discontinuous sandstones, conglomerates, and coals (Richter 1981; Lowry et al. 1983; Arch Mineral Corporation 1991; Rosebud Coal Sales Company 1989). The Hanna No. 2 coal lies between strata with the lower hydraulic conductivities (personal communication, August 2001, with Duane Zavadil, Williams), so vertical water movement between the Hanna No. 2 coal and overlying aquifers would be minimal.

Quaternary alluvial deposits along the HDEPA streams may serve as small isolated surficial aquifers consisting of highly permeable unconsolidated sand and gravel. Because of their limited aerial extent, these surficial aquifers probably yield relatively small quantities of water. Alluvial deposits along the Medicine Bow River may be up to 100 ft thick (Lowry et al. 1973) and thus have the capacity to store large amounts of water, but these aquifers would not be affected by the exploration project and are therefore not discussed further in this EA.

Ground water recharge to the Hanna Formation is mainly from precipitation or snow melt near the basin margins where the aquifers crop out (Richter 1981). Recharge also occurs where streams cross the outcrops and from vertical leakage through underlying aquifers. Ground water movement in shallow aquifers is generally towards local surface drainages and ultimately to the Medicine Bow River (Richter 1981) or into basins with no outlet. Water-level data from the Seminoe I and II Coal Mines, located southwest of the proposed project area, indicate that the direction of ground water flow is to the northwest, nearly parallel to the strike of the coalbeds (Arch Mineral Corporation 1988, 1991).

While aquifer characteristics are poorly known, aquifer permeability and potential water yield tend to be related to rock characteristics and degree of fracturing (Richter 1981). Measured water yields from wells drilled in the vicinity range from very low (1 gallon per minute [gpm]) to moderate (150 gpm). Clinker deposits or alluvium may have higher yields. Well yields from coalbeds are expected to be approximately 550 bbl/day (0.36 cfs) initially, declining to 350 bbl/day (0.23 cfs) during 18 months of testing. Springs within the Hanna Basin (some of which occur along the proposed pipeline route) usually discharge between 1 and 10 gpm (Richter 1981).

Ground water levels in the area depend on the aquifer in which the well is completed and well depth. Thirty-four water well permits have been issued in the exploration area, 33 of which were recently permitted by the WSEO for development by Williams (see Appendix F). Nine of these 33 have been drilled for the purposes of CBM exploration, all on private land. The other well was developed by Arch Mineral Corporation. Completion depths of 3,576-4,260 ft below ground level were reported for five of Williams's wells. The Arch Mineral Corporation well was completed at 300 ft below ground surface. An additional 38 wells occur in the Hanna Draw Federal unit, most of which are associated with coal mine ground water dewatering or monitoring or with ranching. None of these wells are completed any deeper than 706 ft. Numerous abandoned wells/cancelled water rights were held by MetFuel, Inc., and these wells were completed at depths of 4,450-6,015 ft. Pipeline construction would not affect water wells. Existing data are limited and, therefore, the shape of the potentiometric surface within each water-bearing unit cannot be determined. Most of the coalbed and sandstone aquifers of the Hanna Formation dip into the basin. The lower aquifers usually crop out at higher elevations than the upper aquifers, and, therefore, the lower aquifers have a higher potentiometric surface in the center of the basin than the upper aquifers. Ground water elevations measured from wells in the vicinity range from 6,400 to 7,000 ft above sea level (BLM 1993). Static water levels range from 1 ft aboveground to 189 ft below ground.

A composite sample of six producing wells on private land in the exploration are and several other samples were collected and analyzed. The data show that the water is suitable for livestock and wildlife watering and aquatic life (Tables 3.5 and 3.6), the only uses proposed for the stored water.

3.1.7 Noise and Odor

Ambient noise levels throughout the HDEPA are generally rural in nature, with the only appreciable noise being wind, the existing CBM development, traffic, recreational off-road vehicles (ORVs), an occasional aircraft, and animals. The predominant noise source in the area is the wind, and ambient noise levels are strongly correlated with wind speed (BLM 1995a, 1995b). Average hourly wind speeds increase throughout the morning, peak in early afternoon, and decrease in late afternoon. Ambient noise levels follow a similar pattern, increasing from 30 to 40 A-weighted decibels (dBA) in the morning, increasing to 50 to 60 dBA during the afternoon, and then decreasing to 30 to 40 dBA in the evening. These levels correspond to the noise levels of a soft whisper (30 dBA), a quiet office (50 dBA), and a normal conversation (60 dBA). Traffic traveling to and from the existing CBM wells cause infrequent noise increases. Noise-sensitive areas in the HDEPA include greater sage-grouse leks and nesting areas during the breeding and nesting season, occupied raptor nests, and crucial winter range for big game species during severe winter.

No specific data are available for odors in the HDEPA; however, other than the natural odors created by vegetation, wildlife, and livestock, HDEPA odors are likely associated with existing CBM wells, roads, and coal mines. Occasional vehicular emissions from cars, trucks, and ORVs may also contribute to odors experienced on the HDEPA. Most odors are likely to be quickly dispersed by the wind.

Table 3.5 Produce Water Quality from Existing CBM Wells in the Exploration Area

Table 3.5 Produced Water Quality from Existing CBM Wells in the Exploration Area .[1]

Parameter	Produced Water Quality								
	Composite (6 wells)	NPDES Application[2]	Hanna Draw No. 1(a)[3]	Hanna Draw No. 18(a)[3]	Hanna Draw No. 18(b)[3]	Hanna Draw No. 1(b)[3]	Hanna Draw No. 10	Hanna Draw No. 19	Hanna Draw No. 6
MAJOR IONS									
Bicarbonate as HCO_3 (mg/l)	658	956	801	1,311	422	678	791	566	695
Carbonate as CO_3 (mg/l)	<1	na	111	47	7.0	25.0	13	10.6	13.6
Chloride (mg/l)	16	484	843	24.3	10.5	35.0	32	11	15
Fluoride (mg/l)	3.0	2.6	na	2.62					
Sulfate (mg/l)	290	14.1	<1.0	14.1	434	1,030	99	329	219
Calcium (mg/l)	6	na	22.8	12.7	10.8	7.0	12	5	6
Magnesium (mg/l)	3	0.32[2]	13.1	3.9	2.5	2.6	3.5	1.3	1.5
Potassium (mg/l)	3	na	na	6.2	7.8	9.0	3.7	2.8	2.9
Sodium (mg/l)	380	22.3[2]	587	440	366	386	339	354	349
METALS[3]									
Aluminum (µg/l)	<50	<50	na	na	--	--	--	--	--
Antimony, total (µg/l)	<5	<5	<5.0	<5.0	--	--	--	--	--
Arsenic, total (µg/l)	0.3	1.1	1.10	<1.0	--	--	--	--	--
Barium, total (µg/l)	200	1,191	2,300	181	--	--	--	--	--
Beryllium, total (µg/l)	<0.03	<1	<0.10	<1.0	--	--	--	--	--
Boron, dissolved (mg/l)	<100	na	na	170	--	--	--	--	--
Cadmium (µg/l)	<0.1	<0.1	na	na	--	--	--	--	--
Chromium (µg/l)	4	<1	na	na	--	--	--	--	--
Copper (µg/l)	3	7	na	na	--	--	--	--	--
Iron, dissolved (µg/l)	40	5,595	2,370	1,110	930	2,850	5,880	560	550
Lead (µg/l)	<2	na	na	na	--	--	--	--	--
Manganese, dissolved (µg/l)	75	115	80	140	--	--	--	--	--
Manganese, total (µg/l)	80	145	100	140	--	--	--	--	--

Table 3.5 (Continued)

Parameter	Produced Water Quality								
	Composite (6 wells)	NPDES Application[2]	Hanna Draw No. 1(a)[3]	Hanna Draw No. 18(a)[3]	Hanna Draw No. 18(b)[3]	Hanna Draw No. 1(b)[3]	Hanna Draw No. 10	Hanna Draw No. 19	Hanna Draw No. 6
Mercury (µg/l)	<0.06	<0.1	na	na	--	--	--	--	--
Nickle (µg/l)	<10	<10	na	na	--	--	--	--	--
Selenium (µg/l)	<5	<5	na	na	--	--	--	--	--
Silver (µg/l)	<3	<3	na	na	--	--	--	--	--
Thallium, total (µg/l)	<10	<10	<10.0	<10.0	--	--	--	--	--
Zinc (µg/l)	20	<10	na	na	--	--	--	--	--
NON-METALS									
Alkalinity, Total as $CaCO_3$ (mg/l)	540	1075	na	na	--	--	--	--	--
Conductivity @ 25°C (µmhos/cm)	1,650	3,185	4,410	1,060	1,710	1,760	1,540	1,630	1,600
Cyanide, Total automated (µg/l)	<5.00	9.5	14.0	<5.0	--	--	--	--	--
Hardness as $CaCO_3$ (mg/l)	23	75	111	47	38.0	28.0	45	18	21
pH s.u.	8.67	8.5	8.83	8.2	8.45	8.81	8.47	8.52	8.54
Sodium adsorption ratio (mg/l)	34.7	20.7	24.2	17.2	26.0	31.5	22	36.1	32.9
Total Dissolved Solids (mg/l)	1,020	1,790	2,420	1,160	1,080	1,110	982	1,050	1,030
Total Petroleum Hydrocarbons (mg/l)	<1.0	na	<1.0	<1.0	--	--	--	--	--
Radium 226 (pCi/l)	na	1.4	2.3	--	--	--	--	--	--

[1] na = constituent not reported; µg = micrograms; mg = milligrams; pCi = picocuries, l = liters; µmhos = micromhos; s.u.= standard units.
[2] Produced water quality reported in Williams' NPDES application (see Appendix C).
[3] Two samples (a and b) were collected and analyzed from Hanna Draw Well Nos. 1 and 18.
[4] These analyses reported in milliequivalents/liter.
[5] Soluble metals unless otherwise noted.

Table 3.6 WDEQ Water Quality Standards.

Constituent[1]	Class 3A Surface Water (Chronic Level for Aquatic Life and Wildlife)	Acute Level for Aquatic Life and Wildlife	Class III Ground Water (Standard for Livestock Consumption)
Chloride (mg/l)	230	860	2,000
Sulfate (mg/l)	--	--	3,000
Aluminum (µg/l)	87	750	5,000
Cadmium (µg/l)	2.2	4.3	50
Chromium (µg/l)	74.1 (III); 11 (VI)	569.8 (III); 16 (IV)	50
Copper (µg/l)	9	13.4	500
Lead (µg/l)	2.5	64.6	100
Mercury (µg/l)	0.77	1.4	0.05
Nickel (µg/l)	52.0	468.2	--
Selenium (µg/l)	5	20	50
Silver (µg/l)	--	3.4	--
Zinc (µg/l)	118.1	117.2	25,000
Boron (µg/l)	--	--	5000
Iron (µg/l)	1,000	--	--
Manganese (µg/l)	1,462	3110	--
Arsenic (µg/l)	150	340	200
Cyanide, Total Automated (µg/l)	5.2	22	--
pH (s.u.)	6.5 - 9.0	6.5 - 9.0	6.5 - 8.5
Total Dissolved Solids (TDS) (mg/l)	--	--	5,000

[1] µg = micrograms; mg = milligrams; pCi = picocuries, l = liters; µmhos = micromhos; s.u.= standard units.

3.2 BIOLOGICAL RESOURCES

3.2.1 Vegetation

3.2.1.1 Plant Communities

The major vegetation type within the HDEPA is sagebrush steppe (TRC Mariah Associates Inc. 2001), which occurs throughout the exploration area and along the pipeline corridor. The sagebrush steppe type consists of a mosaic of about 50% sagebrush shrublands and 50% open grassland. The rolling topography produces dry upland areas that support primarily herbaceous vegetation, while Wyoming big sagebrush communities dominate draws, depressions, and snow accumulation areas.

The sagebrush shrublands are dominated by Wyoming big sagebrush, black sagebrush, bitterbrush, and rabbitbrush. Common grasses and forbs include western wheatgrass, needle-and-thread grass, blue grama, prairie Junegrass, threadleaf sedge, wild buckwheat, western yarrow, scarlet globemallow, penstemon, and paintbrush.

The upland grass patches support communities of grasses, sedges, and forbs. Common grasses typically include needle-and-thread grass, bluebunch wheatgrass, and western wheatgrass. Common forbs include penstemon, western yarrow, and scarlet globemallow; upland sedges (e.g., threadleaf sedge) may also be present.

TEP&C plant species are discussed in Section 3.2.3.

3.2.1.2 Wetlands/Riparian Areas

Numerous wetlands occur along the Medicine Bow River within the exploration area--none of these would be disturbed and thus are not discussed further in this EA. Six additional potential wetland sites are known to occur in the exploration area. Three of these wetland sites are diked or impounded (Figure 3.4) (USFWS n.d.), and Section 12 contains two large playas. Wetlands and other waters of the U.S. would be identified on a site-specific basis for all proposed well pad, road, and gathering line locations during the APD process.

Figure 3.4 Potential Wetlands.

The pipeline corridor contains over 50 potential wetlands. Once the pipeline route has been established, the acreage of wetlands and other waters of the U.S. to be impacted would be assessed and mitigation would be developed in consultation with the COE.

3.2.1.3 Nonnative Invasive Species

No significant infestation of nonnative invasive species was noted on federal lands in the HDEPA during site visits in May and June (TRC Mariah Associates Inc. 2001). Although some small areas of nonnative invasive species invasion likely occur on the HDEPA, they are not widespread. Designated and prohibited nonnative invasive species that may occur in the area include field bindweed, Canada thistle, leafy spurge, perennial sow thistle, quackgrass, hoary cress (white top), perennial pepperweed (giant white top), ox-eye daisy, skeletonleaf bursage, Russian knapweed, yellow toadflax, Dalmation toadflax, Scotch thistle, plumeless thistle, dyers woad, houndstongue, musk thistle, spotted knapweed, diffuse knapweed, common burdock, purple loosestrife, and salt cedar (personal communication, May 2001, with Larry Justesen, Carbon County Weed and Pest District Supervisor).

3.2.2 Wildlife and Fisheries

The topography, water resources, soils, and vegetation on the HDEPA provide habitat for numerous wildlife species as discussed below.

3.2.2.1 Big Game Animals

Two big game species, pronghorn antelope and mule deer, regularly occur on the HDEPA. Elk may also occasionally occur in the area but are not considered common residents.

Pronghorn Antelope. Pronghorn in the HDEPA belong to the Medicine Bow herd, which includes five hunt areas: 41, 42, 46, 47, and 48 (WGFD 2000). The WGFD population objective for the Medicine Bow herd is 45,000 animals, and the estimated end-of-year population

in 1999 was approximately 31,542, 13,458 animals below objective. The 5-year population average for the herd is 27,802 or 62% of objective.

Approximately 2,804 acres (15%) of the pronghorn range on the HDEPA is considered crucial winter/year-long range (Figure 3.5). Winter/year-long range is that in which a portion of the area is used year-long but during winter has a significant influx of animals from other seasonal ranges (WGFD n.d.). In addition, crucial winter range is defined as winter range that has been documented as the determining factor in a population's ability to maintain itself at a desired level over the long-term (WGFD n.d.). Crucial winter/year-long range is located in the northern portion of the HDEPA on moderately dissected terrain containing sagebrush. The 2,804 acres of crucial winter range for pronghorn represent 15% of the total crucial winter range for the Medicine Bow herd. An estimated 7,152 acres (39%), located along the proposed pipeline corridor south of State Highway 30/287, is winter/year-long range. The remaining 45% of the HDEPA (8,195 acres) is considered year-long and spring/summer/fall pronghorn range.

Mule Deer. Mule deer in the HDEPA are part of three herds: the Shirley Mountain, Platte Valley, and Sheep Mountain herds (Figure 3.6). The Shirley Mountain herd unit contains hunt areas 70, 71, and 72 and occupies 52% of the HDEPA (9,461 acres). The WGFD population objective for the Shirley Mountain herd is 10,000 animals, and the estimated end-of-year population in 1999 was approximately 6,883 (WGFD 2000) or approximately 3,117 animals below objective. The 5-year population average was 7,367 mule deer, or 74% of objective. About 346 mule deer within this herd were harvested during the 1999 season.

Range types occupied by the Shirley Mountain herd within the HDEPA include year-long (41% of the HDEPA), crucial winter/year-long (<3%), and winter/year-long (8%) (Figure 3.6). The 540 acres of crucial winter/year-long range in the HDEPA represent <1% of the crucial winter range within the Shirley Mountain herd. Crucial winter/year-long range occurs along the Medicine Bow River in the HDEPA.

Less than 1% of the HDEPA is occupied by the Platte Valley mule deer herd (Figure 3.6), which includes hunt areas 78, 79, 80, 81, 83, and 161. The WGFD population objective for this herd

Figure 3.5 Medicine Bow Pronghorn Antelope Herd Range Types.

Figure 3.6 Shirley Mountain, Sheep Mountain, and Platte Valley Mule Deer Herd Range Types.

is 20,000 animals, and the estimated 1999 end-of-year population was approximately 16,206 (WGFD 2000) or 3,794 animals below objective; the 5-year population average was 14,001 mule deer, or 70% of objective for the herd. A total of 1,180 mule deer was harvested from the Platte Valley herd during the 1999 season. The only range type for this herd in the HDEPA is year-long range (77 acres).

Areas south of State Highway 30/287 within the proposed gas sales pipeline corridor are within the area occupied by the Sheep Mountain mule deer herd (hunt areas 61, 74, 75, 76, and 77); it comprises 54% (8,126 acres) of the HDEPA. The population objective for 2000 was 15,000 mule deer; actual population was estimated to be 13,656 or 1,344 deer below objective. About 477 mule deer within this herd unit were harvested in 1999. The only range type for this herd along the sales pipeline route is winter/year-long range. The pipeline corridor south of State Highway 30/287 crosses 8,533 acres (47% of the HDEPA) of winter/year-long range for the Sheep Mountain mule deer herd (Figure 3.6).

The southern portion of the pipeline corridor passes through elk winter/year-long range for the Snowy Range Herd. The project area is not considered to be range for white-tailed deer or moose, although white-tailed deer may be rare visitors (WGFD 2000).

3.2.2.2 Other Mammals

Based upon range and habitat preference, eight mammalian predator species are likely to occur on the HDEPA and adjacent areas (WGFD 1999; Clark and Stromberg 1987). These are coyote, raccoon, long-tailed weasel, badger, western spotted skunk, striped skunk, mountain lion, and bobcat.

Also based upon range and habitat information, three lagomorph species--desert cottontail, black-tailed jackrabbit, and white-tailed jackrabbit--would likely occur on the HDEPA (USGS 1996; Clark and Stromberg 1987; WGFD 1996; Mariah Associates, Inc. 1979). Other small mammals present would likely include least chipmunk, Wyoming ground squirrel, thirteen-lined ground squirrel, northern pocket gopher, olive-backed pocket mouse, Ord's kangaroo rat, deer

mouse, northern grasshopper mouse, bushy-tailed woodrat, and vole. White-tailed prairie dog colonies are also known to be present (Figure 3.7).

3.2.2.3 Raptors

All raptors and their nests are protected from take or disturbance under the *Migratory Bird Treaty Act* (16 U.S.C. 701-715) and *Wyoming Statutes* 23-1-101 and 23-3-108. Certain species are also afforded protection under the *Bald Eagle Protection Act* (16 U.S.C. 668-668d) and ESA (16 U.S.C. 1531 et seq.).

Raptor species known to occur or to potentially occur in the project area include bald eagle, golden eagle, ferruginous hawk, rough-legged hawk, red-tailed hawk, Swainson's hawk, prairie falcon, peregrine falcon, American kestrel, merlin, Cooper's hawk, sharp-shinned hawk, northern harrier, turkey vulture, osprey, great-horned owl, and burrowing owl. Most breeding species migrate to more hospitable climates during the winter; however, golden eagles and great-horned owls may remain year-round.

Twenty-two known ferruginous hawk nests, two Swainson's hawk nests, five golden eagle nests, three red-tailed hawk nests, three prairie falcon nests, and four unknown raptor nests (Figure 3.8) are known to occur on or within 1.0 mi of HDEPA. The known raptor nests are located in topographically diverse areas within the HDEPA, and the numerous rock outcrops and cliffs in and adjacent to the HDEPA provide suitable substrates for raptor nesting; consequently, other nests are likely to occur in the vicinity. The entire HDEPA is considered suitable habitat for raptor hunting, foraging, and perching.

3.2.2.4 Upland Game Birds

Two species of upland game birds, greater sage-grouse and mourning dove, occur within and adjacent to the HDEPA.

Figure 3.7 Prairie Dog Colonies.

Figure 3.8 Known Raptor Nests on or Adjacent to the HDEPA (Includes Nests that Are More Than 1.0 Mile from the Project Area Boundary).

Greater Sage-Grouse. Greater sage-grouse habitat is found throughout the HDEPA on bottomlands and uplands. Four known greater sage-grouse leks (strutting and breeding areas) occur in the proposed exploration area, one of which was found to be active in 2000 (Figure 3.9). Five leks occur within 2.0 mi of the proposed drilling area, two of which were active in 2000 and one of these two was active in 2001. An additional 23 lek locations occur on or within 2.0 mi of the proposed pipeline corridor, and two of these were active in 2001.

No greater sage-grouse wintering habitat occurs in the proposed exploration area (TRC Mariah Associates Inc. 2001). Approximately 1,500 acres within 2.0 mi of the pipeline corridor is greater sage-grouse wintering habitat (Figure 3.9) (TRC Mariah Associates Inc. 2001). The area within 2 mi of a lek is considered potential nesting habitat. Approximately 1,485 acres (8.2%) of the HDEPA is greater sage-grouse breeding habitat, and approximately 12,693 acres (70.2%) is potential nesting habitat (Figure 3.9). These acreages represent 1.1% and 1.8% of known breeding and nesting habitats respectively within the Great Divide Resource Area.

Mourning Dove. This species is a common breeding bird in HDEPA habitats (BLM 1993), although they migrate from the area during the fall and winter. Mourning dove concentrations are usually highest around power lines, buildings, and other areas of human disturbance. Doves likely occur in shrub-covered areas along perennial water sources and washes that provide nesting and roosting cover, and they may fly through the area.

3.2.2.5 Other Birds

Numerous other birds may occur in the project area. The sagebrush steppe habitat attracts an assemblage of songbirds. Local waters/riparian areas attract numerous species of waterfowl, shorebirds, and waders.

Common nongame birds in the HDEPA, based upon range and habitat preference (USGS 1996; WGFD 1996), include common nighthawk, Say's phoebe, western kingbird, horned lark, swallow (violet-green, barn, etc.), black-billed magpie, common raven, rock wren, mountain bluebird, loggerhead shrike, Brewer's sparrow, vesper sparrow, sage sparrow, lark bunting, McCown's

Figure 3.9 Greater Sage-Grouse Habitat Within 2.0 Miles of the HDEPA.

longspur, red-winged blackbird, western meadowlark, Brewer's blackbird, common grackle, and brown-headed cowbird.

Several species of wading/shore birds and waterfowl may occur along the Medicine Bow River and within and around small perennial ponds in the HDEPA. Wading/shore birds may include such species as great blue heron, snowy egret, black-crowned night heron, American white pelican, killdeer, American avocet, and spotted sandpiper. Waterfowl species probably occurring on the HDEPA include pied-billed grebe, American coot, Canada goose, mallard, green-winged teal, northern pintail, blue-winged teal, northern shoveler, gadwall, American wigeon, common merganser, and ruddy duck. Any of these species may occasionally nest within the HDEPA (USGS 1996; WGFD 1999).

3.2.2.6 Fisheries

The Medicine Bow River contains such game fish as brook trout, brown trout, rainbow trout, and walleye (BLM 1990c). Nongame fish include suckers (longnose and white), darters (Iowa and Johnny), creek chub, sand shiner, longnose dace, and carp. Hanna Draw contains fish species such as brook trout, brown trout, and creek chub, although additional species may move into Hanna Draw during periods of high flow. Fishing pressure on these drainages is minimal (BLM 1990c).

3.2.2.7 Other Species

Several species of snakes likely occur in the HDEPA and adjacent lands, as do tiger salamander, northern leopard frog, eastern short-horned lizard, and northern sagebrush lizard.

3.2.3 Threatened, Endangered, Proposed, Candidate , and State-Sensitive Species

The ESA protects plants and animals and their critical habitats listed as TEP&C species. The USFWS provided a list of TEP&C species potentially present in the general HDEPA (Table 3.7). BLM's list of sensitive species (BLM 2001) was used to identify other sensitive species

Table 3.7 USFWS List of TEP&C Species Potentially Affected by the Project.

Common Name	Scientific Name	Status[1]	Habitat/Location
Bald eagle	*Haliaeetus leucocephalus*	T	Found throughout state
Black-footed ferret	*Mustela nigripes*	E	Prairie dog colonies
Canada lynx	*Lynx canadensis*	T	Montane forests
Mountain plover	*Charadrius montanus*	P	Grasslands
Blowout penstemon	*Penstemon haydenii*	E	Sand dunes north of Ferris Mountains
Platte River species	Various [2]	E	Downstream riverine habitat of the Platte River in Nebraska
Colorado River fish species	Various [3]	E	Downstream riverine habitat of the Yampa, Green, and Colorado River Systems

[1] T = threatened, E = endangered, P = proposed for listing as threatened or endangered.
[2] Whooping crane (*Grus americana*), interior least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), pallid sturgeon (*Scaphirhynchus albus*), bald eagle (*Haliaeetus leucocephalus*), Eskimo curlew (*Numenius borealis*), and prairie fringed orchid (*Platanthera praeclara*).
[3] Not listed here because the project area is not within the Colorado River Watershed.

potentially occurring in the area (Table 3.8). Canada lynx (threatened) and blowout penstemon (endangered) are listed as potentially occurring in Carbon County; however, no suitable habitat is present for these species and they are not discussed further in this EA. The project area is not within the Colorado River watershed so Colorado River fish (endangered) would not be affected. Bald eagle, black-footed ferret, mountain plover, and Platte River species are the only TEP&C species that may occur in or adjacent to the HDEPA. These species are discussed below.

Bald Eagle. The bald eagle is a federally threatened species (downlisted from endangered and now proposed for removal from federal listing). One known bald eagle nest occurs within about 2.5 mi of the southern end of the proposed pipeline corridor, south of I-80. Bald eagles are known to occur in the HDEPA (BLM 1993). No known bald eagle winter roosts are present on the HDEPA or within the adjacent 2-mi buffer, but it is possible that bald eagles use trees and

Table 3.8 BLM Wyoming Animal and Plant Species of Concern Documented or Potentially Occurring on or in the Vicinity of the HDEPA.[1]

Species		Other Designation and Ranking: Wyoming Natural Heritage Program; U.S. Forest Service Regions 2 and 4; Wyoming Game and Fish Department[2]	Documented in or Adjacent to the HDEPA[3]	Habitat Type(s)[4]
Common Name	Scientific Name			
MAMMALS				
Swift fox	*Vulpes velox*	Removed from candidate list	No	UB
Townsend's big-eared bat	*Corynorhinus townsendii*	G4/S1B, S2N FSR2, FSR4, NSS2	No	UB
White-tailed prairie dog	*Cynomys leucurus*	G4/S2S3, NSS3	Yes[5]	UB
BIRDS				
Baird's sparrow	*Ammodramus bairdii*	G4/S1B, SZN, FSR2, TBNG, MT	No	UB
Brewer's sparrow	*Spizella breweri*	G5/S3B, SZN	No[5]	UB
Burrowing owl	*Athene cunicularia*	G4/S3B, SZN, FSR2, NSS4	Yes[5]	PD
Ferruginous hawk	*Buteo regalis*	G4/S3B, S3N, FSR2, NSS3	Yes[5]	UB
Greater sage-grouse	*Centrocercus urophasianus*	G5/S3	Yes[5]	UB
Loggerhead shrike	*Lanius ludovicianus*	G5/S4B, SZN, FSR2,	No[5]	UB/FT
Long-billed curlew	*Numenius americanus*	G5/S3B, SZN FSR2, NSS3	Yes	UB
Northern goshawk	*Accipiter gentilis*	G5/S23B, S4N, FSR2, FSR4, NSS4	No[5]	FT
Peregrine falcon	*Falco peregrinus*	G4/T3/S1B, S2N, FSR2, NSS4	No	FT
Sage sparrow	*Amphispiza billineata*	G5/S3B, SZN	No[5]	UB
Sage thrasher	*Oreoscoptes montanus*	G5/S3B, SZN	No[5]	UB
PLANTS				
Gibbon's beardtongue	*Penstemon gibbensii*	G1/S1	No	UB
Nelson's milkvetch	*Astragalus nelsonianus*	G2/S2, CO	No	UB

[1] From Draft Wyoming BLM State Director's Sensitive Species List (Animals and Plants) (BLM 2001).

[2] Rankings:

Wyoming Natural Heritage Program

Uses a standardized system developed by The Nature Conservancy's Natural Heritage Network to assess the global and state wide conservation status of each plant and animal species, subspecies, and variety. Each taxon is ranked on a scale of 1-5, from highest conservation concern to lowest. Codes are as follows:

G = Global rank: rank refers to the rangewide status of a species.
T = Trinomial rank: rank refers to the rangewide status of a subspecies or variety.
S = State rank: rank refers to the status of the taxon (species or subspecies) in Wyoming. State ranks differ from state to state.
1 = Critically imperiled because of extreme rarity (often known from five or fewer extant occurrences or very few remaining individuals) or because some factor of a species' life history makes it vulnerable to extinction.

Table 3.8 (Continued)

2 = Imperiled because of rarity (often known from 6-20 occurrences) or because of factors demonstrably making a species vulnerable to extinction.
3 = Rare, or local, throughout its range or found locally in a restricted range (usually from 21-100 occurrences).
4 = Apparently secure, although the species may be quite rare in parts of its range, especially at the periphery.
5 = Demonstrably secure, although the species may be rare in parts of its range, especially at the periphery.
CO = Colorado.
MT = Montana.
H = Known only from historical records. 1950 is the cutoff for plants; 1970 is the cutoff date for animals.
X = Believed to be extinct.
A = Accidental or vagrant: a taxon that is not known to regularly breed in the state, or which appears very infrequently (typically refers to birds and bats).
B = Breeding rank: a state-rank modifier indicating the status of a migratory species during the breeding season (used mostly for migratory birds and bats).
N = Nonbreeding rank: a state-rank modifier indicating the status of a migratory species during the nonbreeding season (used mostly for migratory birds and bats) ZN or ZB. Taxa that are not of significant concern in Wyoming during breeding (ZB) or non-breeding (ZN) seasons. Such taxa often are not encountered in the same locations from year to year.
U = Possibly in peril, but status uncertain; more information is needed.
Q = Questions exist regarding the taxonomic validity of a species, subspecies, or variety.
? = Questions exist regarding the assigned G, T, or S rank of a taxon.

U.S. Forest Service (FS)
Region 2 = Rocky Mountain Region.
Region 4 = Intermountain Region.

Wyoming Game and Fish Department
The Wyoming Game and Fish Department has developed a matrix of habitat and population variables to determine the conservation priority of all native, breeding bird and mammal species in the state. Six classes of native status species (NSS) are recognized, of which classes 1, 2, and 3 are considered to be high priorities for conservation attention.
These classes can be defined as follows:
NSS1 = Includes species with on-going significant loss of habitat and with populations that are greatly restricted or declining (extirpation appears possible).
NSS2 = Species in which (1) habitat is restricted or vulnerable (but no recent or significant loss has occurred) and populations are greatly restricted or declining; or (2) species with ongoing significant loss of habitat and populations that are declining or restricted in numbers and distribution (but extirpation is not imminent).
NSS3 = Species in which (1) habitat is not restricted, but populations are greatly restricted or declining (extirpation appears possible); or (2) habitat is restricted or vulnerable (but no recent or significant loss has occurred) and populations are declining or restricted in numbers or distribution (but extirpation is not imminent); or (3) significant habitat loss is ongoing but the species is widely distributed and population trends are thought to be stable.

[3] Indicates documentation of amphibian, reptile, or bird species in Carbon County (Baxter and Stone 1980; WNDD 2001); documentation of amphibian, mammal, or bird species within latitude 41°, longitude 107° (Dorn and Dorn 1990; WGFD 1999).
[4] UB = ubiquitous, PD = prairie dog colonies; FT = fly through.
[5] Animal species has been documented breeding within latitude 41°, longitude 107° (Dorn and Dorn 1990; WGFD 1999).

cliffs adjacent to the Medicine Bow River as winter roosting and/or perching sites. Bald eagles require cliffs or large trees associated with concentrated food sources (e.g., fisheries, waterfowl concentration areas) or sheltered canyons for nesting or roosting areas (Call 1978; Edwards 1969; Peterson 1986; Snow 1973; Steenhof 1978;). The lack of such habitat in the HDEPA limits its suitability for nesting or roosting habitat. Bald eagles have been observed nesting and roosting along the North Platte River more than 10 mi southwest of the HDEPA, and migrating bald eagles and those nesting and roosting along the North Platte River may occasionally use the HDEPA for foraging and perching; such use would likely be intermittent and for relatively short periods. Since no known nests or roosts occur near the HDEPA nor are any nests or roosts likely to be established, the proposed project is unlikely to adversely affect bald eagles, and the species is not discussed further in this EA.

Black-footed Ferret. Historically, this part of the Hanna Basin provided ferret habitat--confirmed ferret observations were recorded in 1968 and 1979, and in 1991 two observations of experimental population ferrets were recorded 13 mi north and 20 mi northeast of the Hanna Draw Federal Unit (BLM 1993). The area occupied by prairie dog colonies (potential black-footed ferret habitat) was substantially greater in the early 1990s (4,550 acres) than at present (111 acres). The decline may be due to pest control by ranchers or natural dynamics of the prairie dog population.

Black-footed ferrets were re-introduced in the Shirley Basin of central Wyoming between 1991 and 1994. The HDEPA is within an area designated as "ferret-free" (WGFD and BLM 1991) prior to the reintroduction into Shirley Basin; thus, any ferrets that occur within the HDEPA would be considered part of an experimental/nonessential population.

The Hanna Draw Federal Unit, the northern portion of pipeline corridor, and surrounding areas are located within the Shirley Basin/Medicine Bow Black-footed Ferret Management Area, which itself is divided into Primary Management Zones (PMZs) 1 and 2 and areas outside the PMZs. PMZs are areas designated by WGFD and USFWS to assist in the management of the black-footed ferret reintroduction effort (WGFD and BLM 1991). As in the early 1990s, a majority of the colonies are located within PMZ 2, just outside of the proposed exploration area

and along the pipeline corridor (Figure 3.7). The four small colonies within the exploration area are outside the PMZs but within the Shirley Basin/Medicine Bow Black-Footed Ferret Management Area.

In May 2001, prairie dog colonies on all federal lands and on private lands accessible via public access within the Hanna Draw Federal Unit and the proposed pipeline corridor were mapped in the field using an ocular estimate of colony boundaries and a global positioning system. An estimated 111 acres of white-tailed prairie dog colonies occur within and adjacent to the HDEPA (Figure 3.7). The mapped area does not meet the acreage criterion to be a complex of suitable black-footed ferret habitat (i.e., two or more white-tailed prairie dog colonies within 4.3 mi of each other occupying 200 acres or more). However, additional colonies may occur on private land to which public access is restricted, so there is potential for the HDEPA to contain possible black-footed ferret habitat. Any ferrets that occur in the project area would be considered part of the experimental/nonessential population.

Mountain Plover. Mountain plover has been proposed for federal listing as a threatened species by the USFWS. Suitable mountain plover habitat occurs in patches throughout the HDEPA (Figure 3.10). Mountain plover have not been documented in the project area (BLM 1993; Wyoming Natural Diversity Database [WNDD] 2001). No mountain plover have been observed in the Simpson Ridge area, which has been monitored for several years as part of a proposed windpower project (Johnson et al. 2000). Mountain plover surveys have been completed in suitable habitat within the exploration area in May and June 2001 (in accordance with USFWS guidelines [USFWS 2001]), and no mountain plover have been observed. Since pipeline construction would not commence during the 2001 mountain plover breeding season, no surveys along the pipeline are presently required. Mountain plover surveys of the pipeline disturbance area (0.25-mi buffer) would be conducted if pipeline construction would occur during the mountain plover breeding season in any subsequent years.

North Platte River Water Depletions. Since 1978, the USFWS has consistently taken the position in its Section 7 consultation that federal agency actions resulting in water depletions to

Figure 3.10 Mountain Plover Habitat.

the Platte River systems may affect the endangered whooping crane, interior least tern, pallid sturgeon, and Eskimo curlew, as well as the threatened piping plover, bald eagle (see above), and western prairie fringed orchid. North Platte River depletions are not anticipated as a result of the proposed project due to the depth of ground water-producing formations (approximately 5,000 ft) and the age of the ground water produced (approximately 5,000 years before present). All produced water would be discharged into the water containment reservoir where it would evaporate, so no net gain or loss of water in the surface water system would occur. Thus, the proposed project is unlikely to adversely affect downstream Platte River species.

Grab samples of Hanna Draw Well No. 19 (a producing well) and Seminoe Reservoir were analyzed for deuterium and O^{16}/O^{18} to assess the probable age of produced water. Both samples show that the waters are of meteoric origin; however, they have very different stable isotopic compositions and are not directly related to one another (personal communication, June 2001, with Joe Frank, HydroGeo, Inc.). The Well No. 19 sample had a very negative isotopic composition that is commonly seen in ground water that has been recharged at high elevations or during the last major cold climatic regime, typically an ice age. Ground water in Well No. 19 could not have recharged from a high elevation, given its geographic location; therefore, the well water must have been recharged to the aquifer during the last ice age in this region (about 5,000 years ago), at the earliest.

Water production would not result in Platte River depletions, nor would any development or operation activities, and thus depletions are not discussed further in this EA.

State-Sensitive Species. Three state-sensitive mammal species potentially occur within and/or adjacent to the HDEPA (BLM 2001) (Table 3.8): Townsend's big-eared bat, white-tailed prairie dog, and swift fox. Of these, only white-tailed prairie dog has been documented within the HDEPA (TRC Mariah Associates Inc. 2001; WNDD 2001).

White-tailed prairie dogs occupy grass, shrub-grass, and desert grass communities in Wyoming (Clark and Stromberg 1987) and are distributed throughout the HDEPA (Figure 3.7). These

prairie dog colonies provide a prey base and/or habitat for a variety of state-sensitive raptor species, including ferruginous hawk and burrowing owl, as well as for other wildlife.

Eleven state-sensitive bird species are known to occur or potentially occur within or adjacent to the HDEPA: ferruginous hawk, northern goshawk, peregrine falcon, greater sage-grouse (see above), long-billed curlew, burrowing owl, sage thrasher, loggerhead shrike, Brewer's sparrow, sage sparrow, and Baird's sparrow (BLM 2001; WNDD 2001). Northern goshawk and peregrine falcon may occasionally use the project vicinity for foraging or as a stop-over during migration but probably remain in the area for short periods only. Ferruginous hawk and greater sage-grouse are known to nest in the HDEPA. Long-billed curlew and burrowing owl have been observed in the HDEPA (WNDD 2001) and possibly nest along the Medicine Bow River or in prairie dog colonies, respectively. Breeding and nesting habitat for the other five species occurs within and adjacent to the HDEPA, so these species may be summer residents.

Two state-sensitive plant species potentially occur within and adjacent to the HDEPA: Nelson's milkvetch and Gibbon's beardtongue. Nelson's milkvetch prefers alkaline clay flats, shale bluffs and gullies, pebbly slopes, and volcanic cinders in sparsely vegetated sagebrush, juniper, and cushion plant communities at 5,200-7,600 ft above sea level. Gibbon's beardtongue inhabits sparsely vegetated shale or sandy clay slopes at 5,500-7,700 ft. Habitat for both of these species may occur within the mosaic of shrubland/grassland vegetation in the HDEPA, but none have been observed in the area (WNDD 2001).

3.3 CULTURAL RESOURCES

Cultural resources, which are protected under the *National Historic Preservation Act of 1966*, are nonrenewable remains of past human activity. A total of 60 prehistoric or historic sites has been recorded in the HDEPA. No protohistoric sites, which represent the period when European influences began to have a major effect on Native American lifeways, are known from the HDEPA.

A total of 24 cultural resource investigations has been conducted within the HDEPA between 1955 and 1999. The types of investigations include Class III inventories for pipelines (5), Class II sampling inventories for mines (4), well pad and associated access road inventories (4), Class III inventories for transmission lines (4), Class III inventories for fiber optic lines (2), and one each of a Class II pipeline inventory, a Class II fiber optic inventory, a Class III buried telephone line inventory, a Class III road repair inventory, and a mitigation project associated with the Union Pacific Railroad (UPRR).

3.3.1 Prehistoric Resources

The Northwestern Plains appears to have been inhabited by aboriginal hunting and gathering peoples for over 11,000 years. A chronological framework, pertinent to the HDEPA, has been established for the Northwestern Plains based mostly on artifact typology (primarily projectile points) and radiocarbon-dated archaeological sites. Period names are based on Frison's (1991) modification of Mulloy's (1958) framework for the Northwestern Plains prehistory (Figure 3.11).

The Paleoindian period is associated with big game hunting and includes a series of cultural complexes identified by distinctive large projectile points which are often associated with the remains of large now-extinct mammals (e.g., mammoth, bison, camel, and other megafauna). The Plains Archaic period (which is subdivided into Early, Middle, and Late) is characterized by a range of smaller side-notched, stemmed, or corner-notched projectiles and by more generalized subsistence pursuits including hunting of numerous species of animals and gathering of plant resources. This lifestyle continues throughout the Late Prehistoric period which is marked by the technological change from dart projectiles to the bow and arrow and by the appearance of ceramics. During the Plains Archaic and Late Prehistoric periods, the HDEPA was occupied by small bands of hunter-gatherers whose movements were determined to a large degree by seasonal changes in the occurrence of subsistence resources (BLM 1987:99-100).

A review of the Wyoming SHPO, Cultural Records Office, indicated 45 sites with prehistoric components in the HDEPA (43 prehistoric sites and two sites with prehistoric and historic

Figure 3.11 Chronological Cultural History Framework for the Northwestern Plains.

components). Site types include open camps (25), open camps with stone circles (4), lithic scatters (12), lithic scatters with stone circles (1), lithic scatter with an identified Medicine Wheel (1), and stone circle sites (2). Of the 45 prehistoric sites, five sites are eligible to the National Register of Historic Places (NRHP) (three sites have been recommended as eligible and two sites have been found eligible by the SHPO), 16 sites are not eligible to the NRHP (15 sites have been recommended as not eligible and one site has been found not eligible by the SHPO), and the remaining 24 sites remain unevaluated to the NRHP.

Large-scale block surveys and testing projects conducted for the Medicine Bow Mine southwest of the HDEPA suggest that additional prehistoric site types may occur within uninventoried portions of the project area. Lithic procurement sites associated with river gravels and rock art sites were identified (Zier et al. 1981), and housepit habitation sites have also been documented (McGuire et al. 1984). Rockshelter locations may also be found in the area. Prehistoric site distribution on and adjacent to the HDEPA is most dense near water sources and in association with aeolian deposits (Zier et al. 1981; Kainer and Rodriguez 1982).

3.3.2 Historic Resources

Historic land use in the region began with fur trading expeditions. The Ashley-Smith Expedition entered Carbon County in 1825 (Seiersen 1981), followed by John C. Fremont in 1843. In 1849, a wagon train passed through southern Carbon County along what became known as the Cherokee Trail. The Stansburry Expedition, led by Jim Bridger, also passed through the region in 1849 along a different route farther to the north which became known as the Overland Trail. Construction of the UPRR reached Carbon County in 1868, which spurred the area's economy by encouraging lumbering and mining.

The town of Carbon, approximately 8 mi southeast of the HDEPA, was established by the UPRR in 1868 as the first coal mining town in the area (Seiersen 1981). Mining operations were initiated by the Wyoming Coal and Mining Company and were later taken over by the Union Pacific Coal Company. Coal deposits were depleted at Carbon around 1900, when most coal mining shifted to the Hanna area. A branch line was established to connect the town of Hanna with the UPRR mainline in 1890, and the economy of Hanna is still closely tied to the railroad and coal mining.

The railroad also promoted the growth of the livestock industry in Carbon County. Large ranches became major landholders in the region before 1880; however, severe droughts and winters in the late 1880s bankrupted many of these ranchers (Seiersen 1981). Large-scale sheep grazing started in the area in the late 1800s.

Seventeen sites with historic components have been recorded in the HDEPA (15 historic sites and two prehistoric/historic sites). Site types include sites with historic debris (6), sheepherder camps (4), and one site type each of an historic cairn, a dugout structure, an historic power line, the historic UPRR, the Como Railroad Siding, the Fort Halleck Road, and the Lincoln Highway. Of the 17 historic sites, two sites (the UPRR and the Lincoln Highway) are eligible to the NRHP with SHPO concurrence, seven sites were recommended by the consultants as not eligible to the NRHP, six sites are not eligible to the NRHP with SHPO concurrence, and the remaining two sites remain unevaluated to the NRHP.

3.4 SOCIOECONOMICS

The HDEPA is in Carbon County, which had a population of 15,639 in 2000 compared to a population of 16,659 in 1990--a decrease of 6.1% (U.S. Department of Commerce [USDC] 2001; Wyoming Department of Administration and Information, Division of Economic Analysis 2001). Carbon County is the third largest county in Wyoming, covering nearly 8,000 mi^2. The Medicine Bow National Forest covers much of the southern portion of the county. Rawlins, the largest city in Carbon County, is located along I-80 in central Carbon County and serves as the county seat and economic hub. Rawlins has built a facility and service structure to accommodate the needs of its residents.

Carbon County's economy is structured around the basic industries of extractive minerals, agriculture, timber, and manufacturing. The mining/oil and gas industry is a major contributor to employment and the general economy; however, employment figures in the mining/oil and gas industry declined from 11.8% of the population in 1990 to 5.5% in 1999. Wages earned in the mining/oil and gas industry averaged $50,421 in 1997--223% of the Carbon County average of $22,574 (Wyoming Department of Employment [WDE] 2000). New technologies to enhance productivity within the mining industry will likely cause a decrease in the rate of job growth within this industry as the industry becomes more mechanized (i.e., capital intensive). In 1998, there were 17,000 jobs in Wyoming's mining sector, whereas average annual employment in

1999 was 15,600 jobs--a decrease of 1,400 jobs. However, these industries are very sensitive to changes in commodity prices, and changes are difficult to predict.

The seasonally adjusted unemployment rate in Carbon County in December 2000 was 4.5%, whereas the statewide seasonally adjusted unemployment rate at that time was 3.7% (WDE 2001).

Surface transportation in Carbon County is provided by a network of primary, secondary, local, and primitive roads. I-80 is the principle roadway linking Carbon County towns and cities within southern Wyoming and the national highway system. I-80 is approximately 20 mi south of the HDEPA, and Highway 287, which accesses the towns of Bosler, Rock River, Medicine Bow, Hanna, and Elmo, is approximately 8 mi south of the HDEPA. The Hanna Draw Road bisects the Hanna Draw Federal Unit.

3.5 LAND USE

Carbon County occupies an area of nearly 8,000 mi^2 and contains a diversity of landscapes. The most common land uses in the county include livestock grazing, wildlife habitat, mining/oil and gas, agriculture, and forestry, and Carbon County lands yield a variety of products including wool, beef, timber, trona, jade, clay, oil, gas, and coal. The principle land uses within and adjacent to the HDEPA, although limited, are oil and gas exploration and development (i.e., the current proposal), livestock grazing (Section 3.5.1), wildlife habitat (see Section 3.2.2), coal mining, recreation (Section 3.5.2), and transportation (Section 3.4). There are no residences or dwellings on or adjacent to the HDEPA.

3.5.1 Agriculture/Rangeland

Due to arid conditions and limited soil and water resources, livestock grazing represents the primary form of agriculture in the general HDEPA; however, small floodplain areas adjacent to the Medicine Bow River are used for hay production. Portions of two grazing allotments (Dana Block North and Chase Block) occur in the HDEPA, and domestic cattle, sheep, and horses are grazed (personal communication, June 2001, with Cheryl Newberry, BLM). Grazing on these allotments occurs year-round. Three operators graze livestock on both private and public land within the HDEPA.

The Dana Block North Allotment contains 29,780 federal acres, supporting 4,962 animal unit months (AUMs) for approximately 6 acres per AUM . This allotment occupies 5,180 acres (91% of the exploration area) and contains approximately 863 AUMs on the HDEPA. Three hundred twenty acres within the exploration area are not included in any allotment. The remaining 180 acres are within the Chase Block Allotments (see below).

The Chace Block Allotment (14,996 federal acres and 1,585 AUMs) averages 9 acres per AUM and occurs on 12,971 acres (72%) of the HDEPA. This allotment contains approximately 1,441 AUMs on the HDEPA.

3.5.2 Recreation

Public land on and adjacent to the HDEPA is an important recreational resource for local residents and nonresidents alike. These areas offer a wide variety of recreational opportunities in diverse settings, including camping, ORV use, snowmobiling, fishing, hunting, and hiking. However, the checkerboard landownership pattern within the HDEPA limits recreational opportunities for most individuals to the public lands adjacent to County Road 291.

While only limited recreational use data are available for the HDEPA, big game hunting is likely the predominant recreational activity. No developed recreation sites occur on the HDEPA.

3.5.3 Land Status and Prior Rights

The 18,151-acre HDEPA includes 6,735 acres (37%) of federal surface, with the remaining area in state and private ownership (i.e., checkerboard landownership pattern) (Figure 1.2). Williams has submitted a sundry notice for the use of the existing road developed by MetFuel in the early 1990s, they have obtained a ROW across federal lands to the south of the exploration area (although they have limited use through the mine area at this time), and they have drilled nine wells on private land in the exploration area. The estimated surface disturbance from these developments is approximately 49.0 acres. Surface or mineral ownership would not change as

a result of the proposed project, nor would the rights of existing ROW holders (e.g., County Road 291) be violated, and these subjects are not discussed further in this EA.

3.6 AESTHETICS AND VISUAL RESOURCES

The HDEPA is within VRM Class III and Class IV areas. The exploration area and the northern portion of the pipeline corridor are within a Class IV area, which allows for major modifications of the existing character of the landscape. South of State Highway 30/287, the pipeline corridor is within a Class III area, which calls for partial retention of the existing character of the landscape, and modifications should not dominate the view of the casual observer.

Human intrusions currently affect the visual quality of the HDEPA and surrounding areas, including the presence of highways, roads, railroads, coal mines, towns, pipelines, transmission lines, substations, and existing gas wells.

3.7 HAZARDOUS MATERIALS

Hazardous substances present on the HDEPA include those used and produced in association with natural gas exploration, development, and production as identified in Section 2.1.9 and Appendix E. No hazardous materials are known to be present except those being used or produced under state and federal rules and regulations.

4.0 ENVIRONMENTAL IMPACTS AND MITIGATION

The potential environmental consequences of construction, drilling, completing, operation, and maintenance associated with the Proposed Action (federal land developments--nine well locations and associated developments, an interconnect pipeline and a compressor station constructed on private land) and No Action (two roads to access private development but no further development on federal land)Alternatives are discussed for each potentially affected resource. Implicit in the No Action Alternative is that if well development on federal lands is denied, the interconnect pipeline and the compressor station would not be needed (i.e., any production from wells on private lands would be transported from the field via temporary surface gas gathering lines). An environmental impact is defined as a change in the quality or quantity of a given resource due to a modification in the existing environment resulting from project-related activities. Impacts may be beneficial or adverse, may be a primary result (direct) or a secondary result (indirect) of an action, and may be permanent or long-lasting (long-term--more than 5 years) or temporary and of short duration (short-term--5 years or less). Impacts may vary in degree from a slightly discernable change to a total change in the environment.

In accordance with CEQ regulation 40 C.F.R. 1502.16, this chapter includes a discussion of the direct and indirect effects of the Proposed Action and No Action Alternatives. Possible conflicts between the Proposed Action and No Action Alternative and the objectives of the BLM RMP (BLM 1987, 1988b, 1990a), as well as state and local land use plans and policies, are identified, as are potential additional means to mitigate adverse environmental impacts that go beyond the applicant-committed and agency-required measures. Potential impacts for this project were quantified where possible. The use of adjectives such as moderate, low, and negligible have been avoided wherever possible because this EA is an analytical document, not a decision document (BLM 1996). The Decision Record for this project will be the decision document. Impact assessment assumes that applicant-committed measures are successfully implemented. If such measures are not implemented (e.g., state and private lands), additional adverse impacts may occur. The applicant-committed measures may be implemented on private land depending on landowner preference.

The Proposed Action for this project involves BLM authorization of nine wells and associated features and an interconnect pipeline on federal lands in the HDEPA. Initial and LOP disturbance associated from the Proposed Action would be approximately 162.7 acres and 39.7 acres, respectively.

Private land developments within the HDEPA have occurred and consist of nine wells and associated access roads (25.3 acres initial and 10.0 acres LOP disturbance, respectively) and the 190-acre water containment reservoir. Authorized federal land developments include two roads for which an ROW has been granted to Williams to access private land for the purpose of developing private leases. Impacts from development on private land are considered under cumulative impacts (see Section 4.11) and not as components of the Proposed Action (federal land development of nine wells and associated features and an interconnect pipeline) or No Action (no additional federal land development) Alternatives. Impacts from previously approved road reconstruction and operation on federal land are considered under the No Action Alternative.

4.1 PHYSICAL RESOURCES

4.1.1 Air Quality

Impacts to air quality would be significant if they resulted in violation of federal and/or state air quality attainment standards.

4.1.1.1 The Proposed Action

The effects of natural gas development on air quality in southwestern Wyoming have been studied extensively in recent years, including the Jonah Field II air quality study that modeled the impacts of 450 wells (BLM 1998b:Appendix G); the Continental Divide/Wamsutter II air quality study that modeled the impacts of 3,000 wells (BLM 1999a, 1999b); and the Pinedale Anticline air quality study that modeled the impacts of 700 wells (BLM 1999c). Only the Jonah Field II study found significant cumulative far-field effects to visibility; however, the Jonah

Field II study used a screening methodology to estimate far-field effects, whereas the Pinedale Anticline and the Continental Divide/Wamsutter II studies used a more refined approach (i.e., CalPuff dispersion modeling system), and these latter studies found exceedences of the 0.5 deciview threshold at nearby wilderness areas to be within an acceptable range. Furthermore, of the 3,000 wells included in the Continental Divide model, only 2,130 (71%) were approved.

There would be some temporary deterioration to air quality in the immediate vicinity of project activities (e.g., construction, drilling, completion, testing, and production) due to particulate matter and exhausts from equipment and vehicles; however, these would be localized, temporary, and quickly dispersed by the wind. Impacts would be minimized by the applicant-committed practices included in Chapter 2.0 (Section 2.1.13.10).

4.1.1.2 The No Action Alternative

Under the No Action Alternative, two roads would be used on federal land. Impacts from use on air quality would be proportionately less than for the nine-well Proposed Action.

4.1.1.3 Mitigation

No additional mitigation is recommended.

4.1.2 Topography and Physiography

Impacts to topography and physiography may be significant if they altered the natural environment in such a way that the beauty of natural vistas would be permanently impaired or if drainages would be permanently altered with resultant adverse impacts on natural water courses.

4.1.2.1 The Proposed Action

Impacts to topography and physiography from the Proposed Action (nine wells and associated facilities on public lands and an interconnect pipeline on a mixture of public and private lands) would occur from the alteration of existing landscape features and potentially increased erosion as a result of well location, facilities, and interconnect pipeline construction. However, Williams would minimize disturbance in sensitive areas (e.g., steep slopes, drainages) and would reclaim all disturbed lands to approximate original conditions upon completion of construction and/or production activities (Sections 2.1.12 and 2.1.13.11). Approximately 162.7 acres of federal land would be disturbed initially, and about 39.7 acres of federal land would be disturbed for the LOP.

4.1.2.2 The No Action Alternative

Under the No Action Alternative, no additional impacts to topography and physiography would occur. Topography and physiography would also continue to be modified by natural processes and may be otherwise impacted by other activities.

4.1.2.3 Mitigation

BLM would recommend that facilities be sited below ridge lines and screened from known vantage points.

4.1.3 Minerals/Geologic Hazards

4.1.3.1 The Proposed Action

The Proposed Action would lead to extraction and use of the CBM resource and possible temporary loss of access to gravel or other potential mineral reserves in the HDEPA and proximal to construction sites. The purpose of the project is to obtain the methane present in the Hanna coals and to put it to beneficial use, so no mitigation would be applied.

The proposed project would not contribute to increased risk of seismic events. Earthquake-induced ground shaking may result in damage to aboveground structures; however, buried structures (e.g., well casing, the pipeline) would only be affected when shaking induces ground failure. Construction would occur such that the chance of damage from these factors would be minimized, although complete protection is impossible.

The only project facility located over the now-closed Shoshone underground mine is the existing Hanna Draw Road. Underground mining using a longwall leaves an overburden rubble pile that typically fills the void in the mined-out area. Subsidence, when and if it occurs, would occur gradually (imperceptibly) over the Shoshone Mine area rather than catastrophically (BLM 1998a), so no impacts from subsidence are anticipated.

Erosion control and reclamation procedures would ensure that no excessive erosion of wind-blown deposits occurs and that the chance of landslides would not be increased.

Floodplains and flooding would not be directly impacted by construction, operation, or maintenance of the project. However, increased sediment may be transported downstream if flooding occurred during construction.

4.1.3.2 The No Action Alternative

The natural gas reserves on federal lands in the HDEPA would not be developed and thus would not be available to meet national energy demands. Development of adjacent private leases may result in the incidental drainage and loss of federal mineral. The federal government would not benefit from royalties and taxes from the project, although state and local governments would. Project-related economic activity, employment, and income would be reduced by about 36% (a total of 16 wells, rather than 25) from that described for the Proposed Action. Also, Williams's rights to develop their leases would be infringed, which would be a significant adverse impact that would violate contractual agreements between the government and the leaseholders.

The No Action Alternative is available to the BLM if T&E species or their habitat would be affected and/or environmental impacts of the Proposed Action are unacceptable.

Under the No Action Alternative, impacts from flooding would be similar to those described for the Proposed Action but reduced due to less surface use. Floodplains would not be impacted.

Under the No Action Alternative, impacts from geologic hazards would be similar to those described for the Proposed Action--the Hanna Draw Road crosses the Shoshone No. 1 underground mine.

4.1.3.3 Mitigation

No additional mitigation is recommended.

4.1.4 Paleontology

Impacts to paleontological resources may be significant if important fossils would be directly lost or destroyed during construction without proper mitigation or indirectly lost or destroyed due to private collection or vandalism.

4.1.4.1 The Proposed Action

Potential impacts to fossils under the Proposed Action may result from the loss/destruction of fossils during construction and/or from private collection or vandalism due to increased human presence in the area. Impacts would be minimized because Williams has committed to the recovery or avoidance of any paleontological resources uncovered during ground-disturbing activities, if such recovery or avoidance were deemed necessary by the BLM (Section 2.1.13.4). Dr. Jason Lillegraven, Professor of Geology at the University of Wyoming, concurs with this evaluation (Winterfeld 2001).

4.1.4.2 The No Action Alternative

Under the No Action Alternative, paleontological resources would not be affected.

4.1.4.3 Mitigation

No additional mitigation is recommended.

4.1.5 Soils

Impacts to soils may be significant if a reduction in soil productivity and/or increased erosion would prevent successful reclamation and revegetation and/or excessive soil loss occurs.

4.1.5.1 The Proposed Action

A total of approximately 162.7 acres of federal land would be disturbed in the short-term, and 39.7 acres of federal land would be disturbed for the LOP (see Table 2.1). Direct impacts to soils would include soil exposure due to vegetation removal, mixing of soil horizons, loss of topsoil productivity, soil compaction, and increased susceptibility to wind and water erosion. These impacts may, in turn, result in increased runoff and erosion and possible increased sedimentation in the Medicine Bow River. The potential for increased surface runoff and erosion would be greatest in the short term immediately after surface disturbance and would decline over time due to concurrent reclamation, natural stabilization through particle aggregation, soil structure development, and armoring. Short-term surface runoff control would be accomplished through reclamation and revegetation as described in Surface Use Plans or Plans of Development prepared for each APD and/or ROW application. Reclamation and revegetation procedures would be designed to reduce the susceptibility of disturbed areas to soil erosion in both the short term and for the LOP. The potential for soil contamination due to accidental spills would be limited by appropriate project implementation procedures and the remedial measures applied as specified in SPCC Plans (Section 2.1.9). Since produced water would be discharged into the reservoir rather than into existing drainages and because no irrigation is occurring in the project

area vicinity, the project would not affect sodium adsorption ratios in project area soils. With the implementation of applicant-committed practices designed to protect soils (e.g., minimizing disturbance, avoiding steep slopes, using best management practices for reclamation and revegetation) (Sections 2.1.12 and 2.1.13.12), impacts to soils would be minimized.

4.1.5.2 The No Action Alternative

Under the No Action Alternative, no additional soils impacts would occur. Soils would also continue to be modified by natural processes and may be otherwise impacted by other existing land uses (e.g., livestock grazing, recreation).

4.1.5.3 Mitigation

BLM may deny activities in areas with high erosion potential and/or rugged topography. Any disturbance in the aforementioned areas would require site-specific mitigations. Detailed plans of proposed surface-disturbing actions may be required for developments proposed on slopes and/or in areas where soil or site stability/erodability factors are deemed to be limited by the BLM. This mitigation would reduce the amount of soil lost due to accelerated erosion from disturbance in areas with high erosion potential and/or rugged topography.

4.1.6 Water Resources

Impacts to water could be significant:

- if water quality declined such that existing water quality standards would be violated;
- if existing beneficial uses are adversely affected;
- if WDEQ surface water quality class would be downgraded;
- if WDEQ-imposed water quality limitations are exceeded;
- if violations of the *Clean Water Act* occur; or
- if quantities of water would be depleted such that the water rights of existing users would be violated.

4.1.6.1 The Proposed Action

Potential impacts to surface water resulting from the Proposed Action include increased turbidity, salinity, and sedimentation due to increased runoff and erosion from disturbed areas or accidental spills of petroleum products or other pollutants. Produced water and pipeline test water would be discharged to the containment reservoir, and so produced/discharge water would not affect surface water quality. Wind and water erosion rates would increase above current rates until disturbed areas are successfully reclaimed. The potential for stream sedimentation would be minimized through the implementation of applicant-committed practices and mitigation measures, including proper facility siting to avoid riparian areas and floodplains, use of best management practices, and proper reclamation and revegetation (Sections 2.1.12 and 2.1.13.11). With successful reclamation, only a very minor amount, if any, project-related sediments would reach Hanna Draw or the Medicine Bow River. With the discharge of produced/hydrostatic test water either into the containment reservoir or into an ephemeral stream as described in Section 2.1.8.4, the Proposed Action would not result in violations of the *Clean Water Act.*

No springs or seeps occur in the proposed exploration area. Springs and seeps in the pipeline corridor may be adversely affected (e.g., reduced flows, possible contamination) where construction occurs in source areas. However, proper erosion control and hazardous material containment would reduce the potential for impacts to springs and seeps.

Flood-prone areas would be avoided, where practical, so impacts associated with flooding are not anticipated.

Potential impacts to ground water and current ground water wells from the Proposed Action include water consumption during drilling, completion, testing, and production operations; contamination of shallow aquifers from drilling, fracturing fluids, and/or produced water; loss of ground water in existing wells; and cross-aquifer mixing through the well bore. Minimization of these potential impacts would be accomplished by implementing project-wide environmental practices that include well bore cementing, implementation of SPCC Plans, and compensation for potential loss of ground water wells (Sections 2.1.1.2 and 2.1.13.13).

All produced water would be held in reserve pits or the water containment reservoir; no other surface discharge is proposed. The reservoir is designed to hold 500 acre-ft of water while maintaining 5 ft of freeboard. Calculations in the Water Management Plan (Appendix B) suggest that the volume of produced water would not exceed the capacity of the reservoir. However, if at any time it appears that the reservoir capacity would be exceeded, Williams would either shut in wells or reduce the rate of water discharge in one or more wells. Either of these actions would slightly reduce the amount of information Williams may obtain concerning the productivity of a given well but would not adversely affect their ability to assess the field for possible CBM production. Water quality data show that produced water will be suitable for livestock and wildlife watering and for aquatic life (Tables 3.5 and 3.6), and water in the reservoir will be required to meet the water quality standards set by WDEQ in Williams's NPDES permit.

After the 18-month exploration phase of the project, water in the reservoir would be allowed to evaporate. The private landowner may wish to maintain a reservoir for stock watering, in which case Williams would lower the dam so that the reservoir's size is more appropriate for use as a stock pond. If the landowner does not wish to use the reservoir, the dam would be removed after all the water has evaporated, and the area would be reclaimed. Assuming an annual evaporation rate of 122.5 acre-ft (183.8 acre-ft over the 18-month LOP), an annual precipitation input to the reservoir of 35.88 acre-ft (53.82 acre-ft over the 18-month LOP), and annual run-off into the reservoir of 13.20 acre-ft and assuming the reservoir is full (500 acre-ft) at the end of 18 months of exploration, it would take 6 years to completely evaporate the water in the reservoir. Complete evaporation would likely occur more quickly because, as water levels decline, the water would heat up more quickly and evaporation rates would increase. Water quality would degrade, but each year about 30% of the water that evaporates would be replenished with fresh precipitation. Salt and other major constituent concentrations would increase in a similar manner as local stock ponds, which typically fill and dry annually.

Surface water would not be adversely impacted by interconnect pipeline construction because of the various applicant-committed practices described in Chapter 2.0. The small amount of water used for pipeline testing and dust control would not affect downstream users.

Reservoir stage will be monitored to ensure that the reservoir permitted capacity is not exceeded. Water quality monitoring would be conducted in accordance with the NPDES permit.

4.1.6.2 The No Action Alternative

Under the No Action Alternative, impacts to surface water would occur due to use of two roads that cross federal land. Impacts to water resources would include increased turbidity, salinity, and sedimentation due to increased runoff and erosion from disturbed areas or accidental spills of petroleum products or other pollutants. Impacts would be lower than for the Proposed Action because no additional surface disturbance and less surface use would occur. Ground water would not be impacted under the No Action Alternative.

4.1.6.3 Mitigation

BLM may deny activities in areas with high erosion potential and/or rugged topography. Any disturbance in the aforementioned areas would require site-specific mitigations. Detailed plans of proposed surface-disturbing actions may be required for developments proposed on slopes and/or in areas where soil or site stability/erodability factors are deemed to be limited by the BLM. This mitigation would reduce the amount of sediment that would enter surface waters due to accelerated erosion from disturbed areas with high erosion potential and/or rugged topography.

To protect public land, no discharge from the produced water reservoir would be allowed to cross public land surface without BLM's prior approval.

Ground water monitoring, including the installation of ground water monitoring wells, well logging, and pump testing, may be required by BLM to monitor project impacts on ground water. A monitoring plan would be developed and implemented by Williams, subject to BLM's approval.

All mitigations required by WDEQ/WQD as conditions on the water containment reservoir permit would be required by the BLM.

4.1.7 Noise and Odor

Impacts from noise may be significant if long-term project activities exceed the federal 55-dBA standard for noise at residences. This standard would also be applied at other noise-sensitive locations on federal land such as greater sage-grouse leks during breeding season, raptor nests during breeding and nesting seasons, and big game crucial winter ranges during critical winter periods. Impacts from odor may be significant if they preclude existing uses of the HDEPA.

4.1.7.1 The Proposed Action

Project-generated noise under the Proposed Action would exceed 55 dBA during construction, drilling, and completing operations; however, such noise levels would be short-term and mitigated (Section 2.1.13.14) and would not occur at noise-sensitive locations during greater sage-grouse or raptor breeding/nesting seasons or during big game critical winter periods. Compressor engines would generate about 92 dBA at 10 ft (55 dBA at 600-700 ft), and the air intakes 119 dBA at 3 ft (55 dBA at 3,000 ft). These noise levels are for unhoused and unmuffled compressors and would be reduced through required controls by housing the compressors and by installation of silencers on exhaust stacks. If the pilot project is successful, the compressor station would be built, and compressor noise would occur throughout the LOP.

Project-wide environmental practices would avoid construction, drilling, and completion activities if they would adversely affect wildlife (Section 2.1.13.15). Project-generated odors would generally be related to the operation of internal combustion engines and other project facility emissions, especially during construction, drilling, and flaring activities. Potential impacts due to odors would be short-term, and any odors would be quickly dissipated by the wind; therefore, existing uses of the HDEPA would not be precluded.

4.1.7.2 The No Action Alternative

Under the No Action Alternative, noise or odor would occur within the HDEPA due to road use on federal land. Noise and odor levels would likely change as described for the Proposed Action, but impacts would be reduced.

4.1.7.3 Mitigation

The BLM may require that noise levels be limited to no more than 10 dBA above background levels at sage grouse leks and other sensitive resource areas. To comply with these noise limits, BLM may require compressor engines to be enclosed in a building and located at least 600 ft away from sensitive receptors or sensitive resource areas (BLM 1999d).

4.2 BIOLOGICAL RESOURCES

4.2.1 Vegetation

Impacts to plant communities may be significant if there was a long-term reduction in vegetation productivity or a permanent change in species composition.

4.2.1.1 Plant Communities

The Proposed Action. Vegetation on 162.7 acres of the federal land would be disturbed initially; 39.7 acres of federal land would be disturbed for the LOP. The sagebrush steppe communities to be disturbed are common and widespread, and no rare communities or communities of concern are known to occur in the HDEPA (WNDD 2001). Reclamation would provide for revegetation with native plant species common to the area (Sections 2.1.12 and 2.1.13.6). Disturbed areas would produce less forage for a few years until revegetation is successful, after which grasses and possibly forbs would become more abundant and possibly more productive than prior to disturbance. Shrubs may take 20 years or more to reach predisturbance abundance and productivity. A long-term reduction in vegetation productivity would occur in those areas that remain disturbed for the LOP, but no permanent change in species composition would occur.

Reclamation potential in grassland and shrub-dominated areas would be good to excellent; in more barren areas (e.g., rocky knobs, clay slopes, and wind-blown deposits), reclamation would be limited by shallow soils, droughtiness, salinity, alkalinity, steep slopes, noncohesive soils, weather (high winds, drought), short growing seasons, and livestock and wildlife use.

Areas to be avoided, where practical, include:

- areas with high erosion potential (e.g., rugged topography, steep slopes [>25%], windblown deposits, floodplains);
- areas with saturated soils; and
- wetland/riparian areas.

4.2.1.2 The No Action Alternative

Under the No Action Alternative, use of two roads on federal land would not affect vegetation.

4.2.1.3 Mitigation

The BLM may require minimal surface disturbance (e.g., limited ROW surface grading) during gas and water line and interconnect pipeline construction. Where new roads are constructed instead of upgrading existing roads/two-tracks and these new roads make existing roads/two-tracks redundant, the BLM may require reclamation of the existing redundant roads/two-tracks. Both of these mitigations would slightly reduce both initial and LOP surface disturbance.

4.2.2 Wetlands and Riparian Areas

Impacts to wetlands/riparian areas would be significant if a violation of Section 404 of the *Clean Water Act* or Executive Orders 11988 or 11990 occurred and/or if there is degradation of riparian condition or function.

4.2.2.1 The Proposed Action

Any disturbance to wetlands/riparian areas would be minimal and would result primarily from linear facility crossings of these areas. Disturbances to wetlands/riparian areas would be mitigated in accordance with the applicant-committed practices specified in Section 2.1.13.7. The interconnect pipeline alignment would be situated within the proposed corridor so as to avoid/minimize disturbance to wetlands/riparian areas. No net loss of wetlands would occur due to project-related activities. Any disturbance to wetlands/riparian areas or other waters of the U.S. would be appropriately permitted by the COE.

4.2.2.2 The No Action Alternative

Wetlands and riparian areas would not be affected under the No Action Alternative.

4.2.2.3 Mitigation

No additional mitigation is recommended.

4.2.3 Nonnative Invasive Species

Impacts from nonnative invasive species may be significant if new species of nonnative invasive species became established and/or if noxious weed abundance increased such that it adversely affected current land uses.

4.2.3.1 The Proposed Action

Habitat suitable for nonnative invasive species and other undesirable plant species would be created as a result of removal of existing vegetation, and nonnative invasive species may become established and/or more abundant in these areas; however, Williams would take measures to control undesirable plant invasions (Section 2.1.13.5), pursuant to BLM and Carbon County Weed and Pest Supervisor guidance. Nonnative invasive species also may be introduced to the project area by equipment bearing weed seeds--all equipment would be washed using a high-powered washer prior to being transported to the HDEPA and vicinity.

4.2.3.2 The No Action Alternative

Under the No Action Alternative, potential for the introduction of nonnative invasive species on federal land would be restricted to those areas along the two existing road ROWs.

4.2.3.3 Mitigation

No additional mitigation is recommended.

4.2.4 Wildlife and Fisheries

Impacts to wildlife resources may be considered significant:

- if they prevent realization of specified population objectives;
- if they result in the disruption of raptor breeding activities and subsequent reproductive failure;
- if they result in the continuous disruption of greater sage-grouse breeding activities; and/or
- if they preclude the use of the HDEPA by wildlife species that currently inhabit the area.

4.2.4.1 The Proposed Action

Approximately 31.4 acres of year-long and 29.8 acres of crucial winter pronghorn range would be disturbed on federal land in the exploration area. An estimated 54.4 acres of year-long and 45.7 acres of winter year-long pronghorn range on federal land would be disturbed along the pipeline corridor. No winter year-long range and 14.9 acres of crucial pronghorn range would be disturbed for the LOP. An estimated 71.3 acres of year-long/winter and 6.0 acres of crucial winter mule deer range on federal land would be disturbed initially. Approximately 13.1 acres of winter/year-long and 3.0 acres of crucial winter mule deer range would be disturbed for the LOP. Reclaimed areas would produce less forage for a few years until revegetation is successful, after which time grasses and forbs may become more abundant and possibly more productive than predisturbance vegetation. Shrubs, however, may take 20 years or longer to reach predisturbance abundances and productivity.

Noise, especially during construction, drilling, and venting, would reduce big game use of habitat close to such activities. Pronghorn and mule deer would likely habituate to human presence during other phases of the Proposed Action.

Although some level of habitat displacement was noted in pronghorn populations adjacent to oil and gas development in Wyoming, New Mexico, and Texas (Gusey 1986; Guenzel 1987;

Easterly et al. 1991), Easterly et al. (1991) found that pronghorn returned to these habitats once the source of the disturbance left the area. Segerstrom (1982) and Deblinger (1988) determined that a large proportion of the pronghorn populations inhabiting surface mine sites in Wyoming were relatively unaffected by mining activities and habituated to the presence of personnel and vehicles.

Mule deer may also habituate to increased human activity in the area. Mule deer frequented areas in and near oil fields in central Wyoming and appeared less sensitive to human-caused disturbances than pronghorn (Easterly et al. 1991). Irby et al. (1988) noted that low-level oil and gas development in western Montana had little effect on wintering mule deer; high-intensity exploration and production activity, however, may impact populations by making wintering areas unsuitable for mule deer. Mule deer continued to occupy areas immediately adjacent to an operating coal mine in Wyoming (Reed 1981). Mule deer also apparently habituate to the auditory and visual stimuli associated with access roads and have been observed using areas adjacent to these roads (Reed 1981; Easterly et al. 1991).

Increased mortality from vehicle/animal collisions is a potential direct impact that may occur due to increased traffic on and adjacent to the HDEPA for the LOP. Increased access to big game range may also increase legal and illegal harvest (primarily of pronghorn) by providing additional opportunities for access; however, poaching also may be reduced because of the increased human activity in the area. Williams would implement policies to control poaching/harassment of wildlife by their employees and to minimize vehicle/animal collisions (see Sections 2.1.13.15 and 2.1.13.20).

If the exploration project is successful, a compressor station would be constructed on private land and would create long-term noise within the exploration area. Some big game displacement, at least initially, from the compressor station is expected, but big game would likely habituate to the noise as for the other types of human disturbances described above.

During scoping, the USFWS and BLM raised the concern that, as produced water evaporates, compounds in the water, especially selenium, would become increasingly concentrated and would

cause harm to wildlife and livestock using the reservoir. The reservoir is constructed to hold 500 acre-ft of water and would be gradually filled with produced water over the course of the 18 month exploration project. The exploration project would result in the discharge of slightly more (593.0 acre-ft) than one reservoir volume. Evaporation is estimated to be approximately 122.5 acre-ft per year, so over an 18-month life of the exploration project, an estimated 183.8 acre-ft would evaporate, or about 31.0% of the 593.0 acre-ft to be discharged. Table 4.1 shows that produced water quality, even when concentrated by about 33%, would still meet WDEQ standards for livestock and wildlife watering and aquatic life.

The main source of potentially harmful compounds entering the reservoir would be produced water. Little sediment is expected to be contributed from the surrounding lands because the reservoir is located on a topographic high between two drainages, and thus it does not receive sediment contributions typical of terminal lakes. Furthermore, ditches and dikes would be used to divert surface runoff around the reservoir.

Selenium is a naturally occurring element that is typically present in soil at a concentration of approximately 200 µg/kg. The shallowest selenium-bearing Cretaceous sediments occur over 5,000 ft below the ground surface and thus are not a potential source for elevated selenium in the reservoir. Because the produced water contains <5 µg/l selenium, it is not likely that water would contribute to any notable increase in selenium in the reservoir's sediments during the 18 months of reservoir operation. However, the limited period of operation and the low concentration of selenium in the produced water will limit the extent to which evaporative concentration of selenium can occur.

As water evaporates from the reservoir after the 18-month exploration phase of the project, water quality would degrade, but each year about 30% of the water that evaporates would be replenished with fresh precipitation. Salt and other major constituent concentrations would increase; however, since selenium levels in produced water are below detection, the amount of increase in selenium concentration, if any, cannot be predicted. Impacts on water quality due to evaporation would be similar to those of local stock ponds, which typically fill and dry annually.

Table 4.1 Concentration of Selected Compounds/Elements in the Reservoir After 18 Months of Evaporation.[1]

Parameter	Produced Water Quality			
	Composite (6 wells) (Analyzed)	Concentrated 33%[2] (Computed)	Shown in NPDES Application (Analyzed)	Concentrated 33%[2] (Computed)
MAJOR IONS				
Bicarbonate as HCO_3 (mg/l)	658		956	
Carbonate as CO_3 (mg/l)	<1		na	
Chloride (mg/l)	16	21	484	644
Fluoride (mg/l)	3.0		2.6	
Sulfate (mg/l)	290		14.1	
Calcium (mg/l)	6		na	
Magnesium (mg/l)	3		.32	
Potassium (mg/l)	3		na	
Sodium (mg/l)	380		22.3	
METALS[3]				
Aluminum (µg/l)	<50	<66	<50	<66
Antimony, total (µg/l)	<5		<5	
Arsenic, total (µg/l)	0.3	0.4	1.1	1.5
Barium, total (µg/l)	200		1191	
Beryllium, total (µg/l)	<0.03		<1	
Boron, dissolved (µg/l)	<100		na	
Cadmium (µg/l)	<0.1	<1	<0.1	<0.1
Chromium (µg/l)	4	5	<1	<1
Copper (µg/l)	3	4	7	9
Iron, dissolved (µg/l)	40	53	5595	7,441
Lead (µg/l)	<2	<3.0	na	na
Manganese, dissolved (µg/l)	75	99	115	153
Manganese, total (µg/l)	80		145	

Table 4.1 (Continued)

Parameter	Produced Water Quality			
	Composite (6 wells) (Analyzed)	Concentrated 33%[2] (Computed)	Shown in NPDES Application (Analyzed)	Concentrated 33%[2] (Computed)
Mercury (µg/l)	<0.06	<0.1	<0.1	<0.1
Nickle (µg/l)	<10	<13	<10	<13
Selenium (µg/l)	<5	<7	<5	<7
Silver (µg/l)	<3	<4	<3	<4
Thallium, total (µg/l)	<10		<10	
Zinc (µg/l)	20	27	<10	<13
NON-METALS				
Alkalinity, Total as $CaCO_3$ (mg/l)	540		1075	
Conductivity @ 25ºC (µmhos/cm)	1650		3185	
Cyanide, Total automated (µg/l)	<5.00	<7	9.5	12.6
Hardness as $CaCO_3$ (mg/l)	23		75	
pH (s.u.)	8.67		8.5	
Sodium adsorption ratio	34.7		20.7	
Total Dissolved Solids (mg/l)	1020		1790	
Total Petroleum Hydrocarbons (mg/l)	<1.0		na	
Radium 226 (pCi/l)	na		1.4	

[1] na = constituent not reported; µg = micrograms; mg = milligrams; pCi = picocuries, l = liters; µmhos = micromhos; s.u.= standard units.

[2] Concentrated amounts were calculated for only those parameters for which WDEQ standards exist.

[3] Soluble metals unless otherwise noted.

Raptors would be protected by seasonal restrictions near occupied nests during breeding and nesting seasons (Section 2.1.13.15). Because only 39.7 acres of federal land would be disturbed for the LOP, any reductions in raptor prey species would be minimal and unlikely to affect raptor populations.

Greater sage-grouse leks would be protected by restricting construction within 2.0 mi of any lek during the breeding and nesting season. No surface occupancy would be allowed on federal land within 0.25 mi of an active lek. Nesting areas within 2.0 mi of a lek would be surveyed during the nesting season prior to disturbance, and any nests that may be found in these areas would be avoided until nesting is complete (Section 2.1.13.15).

If the pilot project is successful, the compressor would create long-term noise within the exploration area, which may adversely affect strutting greater sage-grouse. BLM may require compressor engines to be enclosed in a building and located at least 600 ft from leks (BLM 1999d). No other noise emanation sources would occur on federal land within 0.25 mi of greater sage-grouse leks.

Mourning doves would not be affected by the Proposed Action because of the low level of disturbance to their habitat and their inherent mobility and the continued availability of suitable habitats on undisturbed lands.

Other mammals, birds, reptiles, and amphibians would be affected by the proposed project. Some habitat would be lost due to surface disturbance and human activity, and some small, relatively immobile animals would be killed, especially in construction areas during construction and along roads due to increased traffic. Project impacts to small mammals would likely be masked by natural variations in populations due to weather, disease, and other natural factors. Similar habitats to those affected by the project are common on and in the vicinity of the HDEPA, and many wildlife species have a high reproductive potential that allows them to rebound from the impacts of any direct mortality.

Initial construction and drilling activities may degrade water quality due to increased erosion and runoff and thus adversely affect fish. This potential impact would be mitigated with proper erosion control throughout the LOP.

4.2.4.2 The No Action Alternative

Under the No Action Alternative, project effects on wildlife would occur due to increased mortality from vehicle animal collisions along the two roads authorized for this project. Wildlife would continued to be disturbed due to traffic on the roads. No additional impacts to wildlife would occur.

4.2.4.3 Mitigation

No additional mitigation is recommended.

4.2.5 Threatened, Endangered, Proposed, Candidate, and Sensitive Species

Any action that would adversely affect or jeopardize TEP&C species or their critical habitat and/or any recovery program for such species would be a significant impact without appropriate consultation with the USFWS and adherence to USFWS BO terms, conditions, and reasonable and prudent measures. Any action that would cause a BLM-sensitive species (Table 3.5) to become federally listed would be a significant impact.

A BA (Appendix D) was prepared for this proposed project and provided to the USFWS with this EA. The following material is a summary of the potential impacts resulting from the proposed project as described in the BA.

4.2.5.1 The Proposed Action

Williams has proposed applicant-committed practices to reduce or eliminate impacts to listed species (Section 2.1.13.16). These mitigations were developed with the BLM and USFWS and are included in the BA for this project (Appendix D).

Black-footed Ferret. It is anticipated that there would be no impact to this species because no black-footed ferrets are known to occur in the HDEPA and mitigation measures for potential impacts to black-footed ferrets would be applied (Section 2.1.13.16). Note that the area south and east of the North Platte River was declared ferret-free in 1991 as part of the ferret introduction plan (WGFD and BLM 1991), so any ferrets that occur in the project area would be considered experimental/nonessential.

Mountain Plover. Since the exact locations of well pads, facilities, and the interconnect pipeline are not yet known, it is not possible to estimate the amount of potential mountain plover habitat that would be lost, although it would likely be minimal: 1) since no mountain plover were observed during surveys and 2) given the small amount of potential habitat in the HDEPA. The direct loss of mountain plover breeding and foraging habitat due to proposed project activities is likely to adversely affect individuals through habitat loss and displacement from directly affected and adjacent areas; however, with the implementation of applicant-committed measures, the proposed project is unlikely to result in a take of individuals. Furthermore, given the limited and scattered nature of ground disturbance and the reclamation of habitats to conditions suitable for plover breeding and nesting, the proposed project is unlikely to cause the long-term displacement of plovers from disturbed breeding and nesting areas.

State-sensitive Species. Project activities that may impact state-sensitive species are similar to those presented for TEP&C and other wildlife species. Most state-sensitive plant and animal species are not anticipated to be adversely impacted by the Proposed Action. Brewer's sparrow, Baird's sparrow, sage thrasher, sage sparrow, long-billed curlew, and loggerhead shrike would likely be displaced during construction; however, adequate undisturbed habitats remain available on and adjacent to the HDEPA. Swift fox, Townsend's big-eared bat, northern goshawk, and peregrine falcon are likely infrequent visitors to the area and would not be impacted. Potential impacts to ferruginous hawks would be mitigated as described for other raptors. Areas of potential Gibben’s beardtongue and Nelson's milkvetch habitat may be disturbed; surveys for individuals of these species would be conducted in potential habitat during the period when these plants can be positively identified. In the event sensitive species are found, they would be

avoided through facility site relocation or impacts would be otherwise mitigated in consultation with the BLM (Section 2.1.13.16).

The species most likely to be adversely affected would be white-tailed prairie dog, greater sage-grouse, and burrowing owl. Impacts to prairie dog colonies would directly (mortality) and indirectly (habitat loss) affect white-tailed prairie dogs and would affect burrowing owls. Some individuals would likely be displaced to adjacent colonies. Impacts to greater sage-grouse are discussed in Section 4.2.4. However, since project development and operation would be performed in a manner to minimize disturbance of potential habitat for these species, potential project impacts are not anticipated to cause the listing of either species.

4.2.5.2 The No Action Alternative

Under the No Action Alternative, use of two roads on federal lands would minimally affect TEP&C species due to human activity along the roads. No other impacts to TEP&C species are anticipated.

4.2.5.3 Mitigation

The BLM may deny all project development actions within areas where TEP&C and other sensitive plant and animal species are found or are likely to occur. This mitigation would reduce the potential for inadvertent destruction of any TEP&C species of inadvertent disturbance of their habitat.

4.3 CULTURAL RESOURCES

Significant impacts to cultural resources may include: 1) the loss of NRHP qualities of cultural resources that are eligible for listing on the NRHP; 2) any surface-disturbing activities within 0.25 mi of a historic trail unless such disturbance would not be visible from the trail or would occur in an existing visual intrusion within the 0.25-mi buffer; and 3) disturbance of sites of religious or cultural significance to Native Americans.

4.3.1 The Proposed Action

Potential impacts to specific eligible or unevaluated properties are unknown at this time; however, it is possible that project construction activities may uncover cultural resource sites, and some of these sites may be NRHP eligible. In the exploration area, potential direct impacts to NRHP-eligible cultural properties would primarily result from construction-related activities; however, since these potential impacts would be mitigated on a case-by-case basis as determined during site-specific APD and ROW reviews, following procedures promulgated under the *National Historic Preservation Act* (NHPA) at 36 C.F.R. 800 and/or the NCPA and WSP, impacts would be reduced. The proposed pipeline route (once it is finalized) would be surveyed for cultural resources prior to any surface disturbance in accordance with the NHPA, and appropriate avoidance and other mitigation measures would be implemented to minimize impacts.

Some increase in indirect impacts to cultural resources, (e.g., unauthorized collection of artifacts) would occur due to increased access to the area. However, these impacts would be reduced due, in part, to the enforcement of the *Archaeological Resource Protection Act of 1979* (ARPA), and inventories and monitoring would locate most significant sites within and adjacent to disturbance areas.

Consultations with Native American groups would be conducted if religious or culturally important sites are identified within the HDEPA, and the BLM would review the potential impacts on a site-specific basis to determine what measures are necessary to prevent or mitigate significant impacts to religious or culturally important areas. Surveys to determine the presence of eligible cultural resources, mitigations required to comply with regulations and stipulations (Section 2.1.13.3), and continued consultation with Native American groups, as necessary, would assure that overall impacts to cultural resources from the Proposed Action would be reduced.

Beneficial impacts to cultural resources from the Proposed Action may include the discovery of important cultural resources during the Class III surveys of proposed development areas.

4.3.2 The No Action Alternative

Under the No Action Alternative, no additional impacts would occur to cultural resources.

4.3.3 Mitigation

No additional mitigation is recommended.

4.4 SOCIOECONOMICS

Impacts to socioeconomics may be significant if they increased demand for temporary housing or for local government facilities in excess of their availability.

4.4.1 The Proposed Action

Because many of the workers on this project would come from the local workforce, the Proposed Action would contribute to the local economy. Demand for temporary housing is anticipated to be low because of the low level of workforce required (Table 2.2) and since many workers would come from the local workforce. In addition, various taxes generated by the purchase of equipment and supplies and development activities and taxes and royalties generated by gas production would generate additional revenues to the county, state, and federal governments.

A hypothetical gas stream of 1 million cubic feet per day (mmcfd) would generate $730,000 annually, assuming a gas price of $2.00 per thousand cubic feet (mcf) (Table 4.2). Assuming transportation costs were $0.25/mcf, this 1-mmcfd stream of gas would generate $79,844 in federal royalties, $38,325 in state severance taxes, and $41,918 in county ad valorem taxes annually. Half of the $79,844 in federal royalties would be returned to the state. In addition, property tax revenues would increase due to the increased tax base resulting from capital improvements, and sales tax revenues would increase as local workers spend most of their earnings in local communities.

Table 4.2 Estimated Annual Income and Tax Revenues Resulting from a One Million Cubic Feet Per Day (1 mmcfd) Stream of Natural Gas.

Item	Value ($)
Gross Annual Income[1]	730,000
Annual Transportation Costs[2]	91,250
Gross Annual Income Less Annual Transportation Costs	638,750
Annual Federal Royalties[3]	79,844
Annual State Severance Taxes[4]	38,325
Annual County Ad Valorem Taxes[5]	41, 918

1 Assumes 365 mmcf gas recovered and sold at $2.00 mcf.
2 Assumes average transportation cost of $0.25/mcf.
3 Assumes 12.5% royalty on gross annual income less annual transportation costs.
4 Assumes 6% rate on gross annual income less annual transportation costs.
5 Assumes 7.5% Carbon County rate on gross annual income less annual transportation costs and federal royalties.

4.4.2 The No Action Alternative

Under the No Action Alternative, the federal royalties (half of which would be returned to the state) would not be generated, and severance taxes to the state and ad valorem taxes to the county would be reduced. Reducing the project size by 36% and eliminating construction of the interconnect pipeline would also reduce the number of employees needed to construct and operate the project.

4.4.3 Mitigation

No additional mitigation is recommended.

4.5 LAND USE

Impacts to land use may be significant if other beneficial uses are severely reduced for the long-term (e.g., recreation) or if there is a reduction in livestock use of a magnitude that requires modifications to grazing allotments or other actions that prevent realization of grazing goals.

4.5.1 The Proposed Action

For the LOP, 39.7 federal acres would be disturbed and unavailable for grazing use. An estimated 162.7 federal acres would be disturbed initially but would be reclaimed and revegetated shortly after disturbance. The 39.7 acres of long-term disturbance on federal land would result in a loss of approximately 6.6 AUMs, or 0.1% of the AUMs in the Dana Block North Allotment. (The Chase Allotment occurs only along the pipeline corridor so no LOP AUM loss would occur.) Reclamation during and after the LOP would return disturbed lands to predisturbance production for livestock grazing. Williams would coordinate project activities with ranching operations to minimize conflicts and would maintain all fences, cattle guards, etc., required for Williams's transportation network (see Section 2.1.13.19).

Hunting opportunities for pronghorn and mule deer on the HDEPA may be reduced for safety and aesthetic considerations (i.e., hunters may choose to hunt in other areas with less industrial development), although project-related roads may increase access to the area. Legal access to federal land would not be restricted or eliminated.

Existing ROWs would be respected, and ROW holders would be notified before any actions occur within such ROWs.

Upon project abandonment, land uses would revert to those that occurred prior to project initiation.

4.5.2 The No Action Alternative

Under the No Action Alternative, no land use changes would occur on federal land (two existing roads would be used) and no additional AUMs would be lost. CBM development on adjacent private lands may affect recreational opportunities in a similar manner as for the Proposed Action.

4.5.3 Mitigation

No additional mitigation is recommenced.

4.6 VISUAL RESOURCES

Impacts to visual resources would be significant if development activities violate BLM VRM class management objectives.

4.6.1 The Proposed Action

Wells and related facilities would be visible from Hanna Draw Road; disturbances within the pipeline corridor would be visible from I-80, State Highways 72 and 30/287, and other roads in and adjacent to the HDEPA. However, these facilities are not anticipated to attract an observer's attention. Project development siting and coloration would be coordinated with BLM during on-site investigations conducted during APD and ROW application field reviews, and, as such, facilities would be sited, designed, and colored to comply with VRM objectives.

4.6.2 The No Action Alternatives

Under the No Action Alternative, visual resources would not be affected by exploration on federal lands or by pipeline construction. Effects on visual resources would be reduced to those created by the use of the two roads.

4.6.3 Mitigation

BLM would recommend that facilities be sited below ridge lines and screened from known vantage points. This additional mitigation would reduce the visibility of facilities to the casual observer.

4.7 HAZARDOUS MATERIALS

Impacts resulting from hazardous materials would be significant if these materials were produced, used, stored, transported, or disposed of in violation of federal or state law and/or as required by SPCC Plans.

4.7.1 The Proposed Action

Impacts to air, soils, surface water, and wildlife may result from accidental hazardous material spills, pipeline ruptures, and/or exposure to these materials. It is likely that only small amounts of soil may be contaminated and, if this occurred, affected areas would be cleaned up in an appropriate and timely manner. Proper containment of oil and fuel in storage areas, containment of fluids in reserve pits, appropriate gas and water line and pipeline design and construction, proper well casing and cementing, and location of wells away from drainages would prevent potential surface- and ground-water contamination (Section 2.1.13.9). Project operations would comply with all relevant federal and state laws regarding hazardous materials and with directives identified in project- and/or site-specific SPCC Plans. Birds and mammals would be excluded from reserve pits that contain potentially harmful substances by installation of fences and/or netting (Section 2.1.13.15).

The partial removal of ground water from coal seams during CBM development may make more oxygen available in the dewatered coal seams, thus contributing to conditions suitable for spontaneous coal combustion. However, the coal seams proposed for dewatering are about 5,000 ft deep and do not outcrop in the HDEPA. At this depth, ground water in the coal seams is under pressure. Water levels in wells completed in the HDEPA coals of interest rise to above

the coal layers, creating a hydraulic head in wells. The partial removal of water from coal seams during CBM development depressurizes the coal seam and reduces this hydraulic head, but this action is not likely to leave the coal seams in a condition where oxygen replaces water and results in spontaneous combustion (BLM 1999d).

Methane migration is highly unlikely because of the depth of the coal seams in the HDEPA. Methane would also be controlled through the implementation of APD conditions of approval that address well control, casing, ventilation, and plugging procedures appropriate to site-specific CBM development plans.

4.7.2 The No Action Alternative

Under the No Action Alternative, impacts due to hazardous materials would occur on federal lands if any spills occur during hazardous materials transportation across federal lands during CBM development on private lands.

4.7.3 Mitigation

If hazardous materials are present within fracturing fluids, the BLM may deny the discharge of these fluids to reserve pits. This additional mitigation would ensure that no wildlife, livestock, or other living organisms are inadvertently exposed to hazardous materials.

4.8 UNAVOIDABLE ADVERSE IMPACTS

Under the Proposed Action, unavoidable adverse impacts (i.e., impacts that cannot be completely mitigated) include the extraction and use of CBM, a nonrenewable resource. An estimated 162.7 acres of federal surface would be disturbed in the short-term, and 39.7 federal acres would be disturbed in the long-term. This disturbance would remove native vegetation, provide opportunities for noxious weed invasion, disturb soils, and result in increased erosion due to wind and water. Some increased runoff and sediments would likely reach local waterways. Surface disturbance would also reduce the amount of native habitat available to wildlife, would

reduce the amount of livestock forage, and may reduce recreational opportunities. Additional temporary impacts to wildlife would occur due to noise and human activity, especially during construction, drilling, and testing and, if the exploration project is successful, from long-term compressor noise. Minor reductions in air quality due to particulate, combustion engine, gas venting, and compression emissions would occur in the short-term, especially during construction and in the long term during operations. Minor changes in topography would occur due to cuts and fills associated with roads and well pad construction. Some loss of unidentified artifacts and/or fossils may occur, and some loss of visual quality would occur. Small spills of, or exposure to, hazardous materials may occur. Under the No Action Alternative, some economic benefits would be lost.

4.9 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

An irreversible and irretrievable commitment of resources is defined as a permanent reduction or loss of a resource that, once lost, cannot be regained. The primary irreversible and irretrievable commitment of resources from the proposed project would be the removal and use of the CBM reserves. Other irreversible and irretrievable commitments of resources would include soil lost through wind and water erosion; inadvertent or accidental destruction of paleontological or cultural resources during construction and/or increases in illegal collecting; loss of animals due to mortality during earth-moving activities or by collisions with vehicles; and labor, materials, and energy expended during construction, drilling, production, and reclamation activities associated with the project.

4.10 SHORT-TERM USE OF THE ENVIRONMENT VS. LONG-TERM PRODUCTIVITY

For the purposes of this EA, short-term use of the environment is that use during the LOP, whereas long-term productivity refers to the period after the project is completed and the area is reclaimed and revegetated. Short-term use of the environment would not affect the long-term productivity of the HDEPA or adjacent areas. After the project is completed and disturbed areas are reclaimed, the same resources that were present prior to the project would be available, except for the gas and water that has been removed. Dewatered coal seams would slowly

recharge; however, the rate of recharge is currently unknown. It may take 20 years or more after the project is abandoned for some of the reclaimed areas to attain shrub conditions comparable to predisturbance levels; however, reclamation would provide conditions to support wildlife, livestock, and recreation. Use of the HDEPA during the LOP would not preclude the subsequent long-term use of the area for any purpose for which it was suited prior to the project.

4.11 CUMULATIVE IMPACTS ASSESSMENT

Cumulative impacts are those that would result from the incremental impacts of the proposed project added to past, present, and reasonably foreseeable future actions. Cumulative impact assessment areas (CIAAs) vary among resources and are generally based on relevant landscape, resource, project, and/or jurisdictional boundaries (Table 4.3).

4.11.1 Reasonably Foreseeable Development

Reasonably foreseeable development is that development likely to occur within the HDEPA or the CIAA within the next 5 years. No reasonably foreseeable developments are known, other than the Proposed Action and development of wells and other facilities on private land. If more development is proposed in the future, additional NEPA analyses, including cumulative impact assessments, would be conducted.

Although SeaWest Windpower, Inc. (SeaWest) holds a ROW to construct and operate wind turbines and related facilities in the Simpson Ridge Vicinity, no wind power development in this area has been proposed for the reasonably foreseeable future. SeaWest has developed the Foote Creek Rim portion of the wind power project, located about 35 mi southeast of the HDEPA. Arch Minerals may develop a coal mine in the Carbon Basin immediately east of the proposed interconnect pipeline (BLM 1998a), although the state has not yet permitted the proposed mine, so the schedule for development is presently unknown. The MetFuel project (BLM 1993) was never developed, and Williams now holds the CBM leases for this area. Two coal mines near Hanna will continue to operate during the life of the exploration project; four are currently being reclaimed.

Table 4.3 Cumulative Impact Assessment Areas.

Resource	Cumulative Impact Assessment Area (CIAA)
Air Quality	Laramie Air Basin
Topography/Physiography	Hanna Mining District
Geology (general)	
Mineral Resources	Hanna Mining District
Geologic Hazards	Hanna Mining District
Paleontological Resources	Hanna Mining District
Soils	Hanna Mining District
Water Resources	
Surface Water	Project affected watersheds
Ground Water	Project-affected aquifers within the HDEPA
Noise and Odor	HDEPA and 1-mi buffer
Vegetation	
Plant Communities	Hanna Mining District
Wetlands/Riparian Areas	Project-affected watersheds within HDEPA
Wildlife and Fisheries	
Big Game	Affected herd units
Other Mammals	HDEPA and 2-mi buffer
Greater Sage-Grouse	Upland Game Bird Management Area 6
Raptors	HDEPA and 1-mi buffer
Fisheries	North Platte River Watershed
Other Species	HDEPA
Threatened, Endangered, Proposed, Candidate, and Other Sensitive Animal and Plant Species	Range of various species
Cultural Resources	Hanna Mining District
Socioeconomics	Carbon County
Landownership and Use	HDEPA
Aesthetics and Visual Resources	Hanna Mining District

4.11.2 Cumulative Impacts

Past actions on or in the vicinity of the HDEPA that continue today and have major influences on the area include the existing nine CBM wells and associated features; the 190-acre water containment reservoir; the Hanna Draw Road and other roads that allow access to the area; the six coal mines; and livestock grazing. Compared to many other parts of the U.S., however, the HDEPA and vicinity remains relatively undeveloped.

For the purpose of this analysis, quantifiable cumulative disturbance estimates resulting from this proposed project in combination with other past, present, and reasonably foreseeable developments include all proposed project developments (i.e., all existing and proposed developments on both public and private lands within the HDEPA) and the existing Hanna Basin coal mines. Proposed and existing disturbance from the proposed project includes an initial disturbance of 344.1 acres and an LOP of 70.0 acres, plus the 190-acre produced water containment reservoir (Table 4.4). Existing disturbance from the six coal mines totals 3,076 acres (Table 4.5). Therefore, total quantifiable initial and LOP cumulative disturbance for this project would be 3,614.1 acres and <3,340.0 acres, respectively. Four of the coal mines are no longer mining and are completing final reclamation, so the cumulative disturbance associated with the mines should decrease over the LOP.

4.11.2.1 Air Quality

The Continental Divide/Wamsutter II air quality study (BLM 1999a, 1999b) demonstrated that both short- and long-term total predicted TSP, PM_{10}, SO_2, CO, volatile organic compounds (VOC), hazardous air pollutants (HAPs), and NO_2 concentrations would comply with applicable air quality standards (i.e., WAAQS and NAAQS) as a result of direct, indirect, and cumulative project emissions (including construction and operation). Analyses presented in the Pinedale Anticline air quality studies (BLM 1999c) found no significant impacts to near-field air quality

Table 4.4 Disturbance Due to Mineral Development in the Hanna Mining District.

Development	Initial Acreage	LOP Acreage
6 coal mines	3,076.0[1]	<3,076.0[1]
9 existing private wells	10.8[1]	2.7[1]
7 proposed private wells	8.4[1]	2.1[1]
Existing CBM roads, private land	14.5[1]	7.3[1]
Proposed CBM roads, private land	36.4[1]	18.2[1]
CBM water containment reservoir	190.0	190.0
Subtotal	3,336.1	<3,296.3
Additional Proposed Action Disturbance		
9 federal wells	10.8[1]	2.7[1]
Existing federal road ROWs	23.7[1]	23.7[1]
Proposed federal road ROWs	26.7[1]	13.3[1]
Proposed interconnect pipeline[2]	212.8[1]	0[1]
Subtotal	274.0	39.7
Cumulative Disturbance	3,610.1	<3,336.0

[1] The sum of these disturbances is 344.1 acres initially and 70.0 acres for the LOP.
[2] Includes federal and private land.

Table 4.5 Hanna Basin Coal Mine Existing Disturbance.

Area	Seminoe II	Seminoe I	Rosebud	Shoshone I	Medicine Bow	Vanguard
Permit Area	9,631	14,761	12,670	5,265	20,352	13,250
Approved to Affect	3,750	4,547	6,727	738	5,765	2,021
Disturbed to Date	3,556	4,534	4,047	383	5,740	2,011
Reclaimed	2,813	4,534	4,017	114	3,734	1,993
Remaining Disturbed	753	0	30	269	2,006	18

standards at well densities of 16 wells per 640-acre section. The coal mines have had to adhere to the stipulations for air quality protection required by their air quality permits. Therefore, coal mining, the proposed project (16 new wells), other existing development (seven wells and the water containment reservoir), and foreseeable development, are not anticipated to result in the degradation of air quality in the Laramie Air Basin or elsewhere.

4.11.2.2 Topography/Physiography, Soils, Surface Water, and Vegetation

Past, proposed, and reasonably foreseeable actions would require restoration of disturbed areas (3,614.1 acres) to predisturbance conditions. Reclamation of private lands would be at the discretion of the landowner and, while it is reasonable to believe that the landowner would require the same reclamation and revegetation standards as the BLM, this would be a matter to be decided by Williams and the affected landowner. Each mine is required to regrade the land to an approved post-mining topography in conformance with Wyoming statutes. Topographic alterations from CBM exploration, such as disturbances from well pads, access roads, the water containment reservoir, and the interconnect pipeline may remain for several years; however, these changes generally affect a very small portion of the total land surface (3.0% of the HDEPA).

The exploration area lies within watershed no. 10180004 (Missouri River, subregion 18, accounting unit 00, cataloguing unit 05), which includes very small portions of one surface mine and the towns of Elk Mountain, Medicine Bow, McFadden, Arlington, and Rock River. Other developments within this watershed include a small portion of one surface coal mine, the UPRR, Interstate 80, State Highways 30/287 and 13, numerous other paved and gravel roads, SeaWest's Foote Creek Rim wind plant, and possibly some clear cuts in the Medicine Bow Mountains. All of these developments affect surface water quality to a small degree--run off from gravel and two-track roads probably contribute most to any surface water impacts. However, the towns implement stormwater runoff control plans, as do the developments requiring federal, state, or county approval, so cumulative impacts to surface water quality are expected to be within acceptable levels. Standard stipulations and project- and site-specific construction and reclamation procedures are required on federal lands to maintain surface drainage patterns,

and these procedures require implementation of reclamation that includes regrading and re-contouring disturbed areas to approximate original conditions, re-establishing appropriate vegetative cover, protecting soils from erosion, and stabilizing reclaimed landscapes. These precautions likely would minimize cumulative impacts to topography, soils, surface water, and vegetation. However, protection of these resources on private lands would be determined by Williams and the landowner, and all mitigation and applicant-committed practices implemented for the Proposed Action may not be included in agreements between Williams and the landowner and therefore not implemented on private surface. Weed control on private lands would be implemented by Williams, pursuant to landowner specifications and state and county regulations governing weed control.

4.11.2.3 Geologic Hazards, Ground Water, Noise and Odors, Land Use, and Hazardous Materials

Cumulative impacts from geologic hazards and to ground water, noise and odor, hazardous materials, and landownership and land use generally would be as described for the Proposed Action for these resources. However, since the level of development would be increased to 25 total wells and associated features, the magnitude of these impacts would be increased.

4.11.2.4 Minerals and Socioeconomics

The proposed project would result in a depletion of CBM resources in the area but would not interfere with the potential recovery of other minerals. Seams in which CBM is being produced are also being mined, but steep dips and faulting would not affect any of the seams currently mined. CBM development would add to the economic well-being of Carbon County, the State of Wyoming, and the U.S. because of increased revenues from job creation, spending, taxes, and royalties.

4.11.2.5 Cultural Resources

Disturbance and/or loss of unidentified sites or artifacts may add to the cumulative loss of information about our heritage in the HDEPA and throughout the region if these resources are

not identified, inventoried, and/or appropriately protected or mitigated. However, such losses are not expected since mitigation measures as identified for the Proposed Action (Section 2.1.13.3) have been implemented for the coal mines and would be implemented under all proposed and potential future regional development projects with federal involvement. In the absence of cultural resource clearances and/or other federally mandated cultural resource protection measures on private lands, increased impacts to cultural resources may occur.

4.11.2.6 Paleontology

With the application of appropriate mitigation (Section 2.1.13.4), cumulative impacts similar to those of cultural resources (Section 4.11.2.5) are anticipated for paleontological resources. The likelihood of disturbing paleontological resources would remain low; however, any fossils uncovered during construction might not be mitigated on private lands in the same way they would be under the Proposed Action, resulting in a loss of those fossils. In addition, natural erosion and illegal collection would continue at current levels.

4.11.2.7 Wildlife and Fisheries

Impacts to pronghorn and mule deer would be as described for the Proposed Action yet increased due to coal mining and private land developments. The minimal additional disturbance occurring within the Medicine Bow pronghorn herd crucial winter range to be affected by the exploration project includes roads, power lines, and portions of Seminoe Reservoir. Pronghorn and mule deer populations would be affected primarily by climatological conditions, especially drought and severe winter weather, and by WGFD harvest quotas. Most other mammal and bird populations would similarly be affected primarily by natural forces, especially the weather. Project developments (e.g., wells, roads, and the pipeline and water and gas gathering lines) may make management of greater sage-grouse and raptor populations more difficult. However, protection of greater sage-grouse leks and nesting habitat and raptor nests (on public land) are strictly enforced and would be applied on future projects to ensure existing populations are maintained. With the proper management of watersheds and produced water discharge (e.g.,

volume and constituent limitations) that may occur under full-field development, cumulative impacts to fish in the North Platte River watershed are not anticipated.

The proposed project may contribute some additional impacts (e.g., habitat loss and increased human presence) to the cumulative effects on black-footed ferret habitat from ranching, coal mining, oil and gas projects, and transportation or on prairie dogs (i.e., black-footed ferret prey base) from non-BLM pest control and recreational shooting, through habitat loss and increased access.

Cumulative impacts to the local mountain plover population, primarily through habitat loss and displacement, as a result of past, proposed, and future projects are unknown. Although disturbance due to ranching, coal mining, oil and gas development, and transportation has removed an unknown portion of potential mountain plover breeding and nesting habitat, the relatively small disturbance acreage (3,614.1 acres), the short-term nature of proposed project disturbances, and the apparent lack of habitat use by plover (TRC Mariah Associates Inc. 2001) make it unlikely that the proposed project, in combination with other regional actions, would jeopardize plover reproduction.

The proposed project may contribute some additional impacts through habitat loss, displacement, and increased human access to the cumulative effects on state-sensitive species from ranching, coal mining, oil and gas projects, and transportation or on prairie dogs (i.e., raptor prey base and burrowing owl habitat) from pest control and recreational shooting.

4.11.2.8 Aesthetics and Visual Resources

Impacts to visual resources from altered viewsheds (i.e., visible project development features--well locations, roads, gas and water lines, the interconnect pipeline, the reservoir, the compressor, the POD--and presence of dust) would increase as development occurs. Since four of the six mines are currently completing final reclamation, visual impacts from mining should diminish over time.

5.0 RECORD OF PERSONS, GROUPS, AND GOVERNMENTAL AGENCIES CONTACTED

Table 5.1 General Record of Persons, Groups, and Governmental Agencies Contacted.

Company/Agency	Individual	Discipline/Position
Williams Production RMT Company	Dean Tinsley Duane Zavadil	Environmental and Regulatory Specialist Environmental Manager
Biodiversity Associates/Friends of the Bow	Eric Bonds	--
Carbon County Weed and Pest Control District	Larry Justesen	Supervisor
Concerned Citizen	Brice G. Carpenter Laverne Hammersten Nubit L. Kite Jill Morrow Lance Morrow Bill Nation Linda Schisel Larry D. Stolworthy	Geologist -- -- Ph.D. Biochemistry B.S. Biology -- -- --
Conservancy of the Phoenix	Reginald D. Atkins	President
Petroleum Association of Wyoming	Dru Bower	Vice President
U.S. Army Corps of Engineers	Mathew Bilodeau	Program Manager
U.S. Fish and Wildlife Service	Michael M. Long	State Supervisor
University of Wyoming	Jason A. Lillegraven	Paleontologist
Wildlife Management Institute	Len H. Carpenter	Field Representative
Wyoming Department of Environmental Quality	Dennis Hemmer	Director
Wyoming Department of Environmental Quality, Water Quality Division	Various	Various
Wyoming Department of State Parks and Cultural Resources, State Historic Preservation Office	Judy K. Wolf	Deputy State Historic Preservation Officer
Wyoming Game and Fish Department	Bill Wichers	Deputy Director
Wyoming Natural Diversity Database	Walt Fertig Laura Welp	Botanist Special Projects Manager
Wyoming Office of Federal Land Policy	Julie L. Hamilton	Assistant Program Administrator
Wyoming Outdoor Council	Thomas F. Darin	Staff Attorney
Wyoming State Geological Survey	James B. Case Lance Cook	Geological Hazards State Geologist

Table 5.2 List of Preparers.

Firm/Company	Name	EA Responsibility
U.S. Bureau of Land Management (ID Team)	Brenda Vosika-Neuman	Team Leader
	John Spehar	NEPA Coordinator
	Cheryl Newberry	Range Management
	Krystal Clair	Recreation/Visuals
	Gay Seay	Realty
	Larry Apple	Wildlife & T&E
	Lloyd Chism	Petroleum Engineer
	Sandra Meyers	Cultural Resources
	Susan Caplan	Air Quality
	Susan Foley	Soils/Weeds
	Richard Schuler	Water Resources
	Mark Newman	Paleontology & Geology
	Mary Apple	Public Affairs
	Larry Jackson	Natural Resource Specialist
	Tom Williams	Natural Resource Specialist
TRC Mariah Associates Inc.	Karyn Coppinger	Project Management, EA Preparation, Quality Assurance/Quality Control
	Roger Schoumacher	EA Preparation, Quality Assurance/Quality Control
	Pete Guernsey	EA Quality Assurance/Quality Control
	Genial DeCastro	Document Production, Quality Control
	Ed Schneider	Cultural Resources
	Craig Smith	Cultural Resources, Quality Assurance/Quality Control
	Larry DeBrey	Biological Field Survey, Data Collection
	Chris Keefe	Biological Field Survey
	Tamara Keefe	Biological Field Survey
	Darek Heubner	Biological Field Survey
	Jan Hart	Water Collection
	Tamara Linse	Technical Editing, Document Production
	S.L. Tiger Adolf	Document Production
	Suzanne Luhr	AutoCAD Drafting
	Anne Hokenstad	Document Production
Erathem-Vanir Geological Consultants	Gus Winterfeld	Paleontology
HydroGeo, Inc.	Joe Frank	Water Dating

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APPENDIX A:

SCOPING ISSUES AND CONCERNS

SCOPING ISSUES AND CONCERNS

- Potential adverse impacts to big game, greater sage-grouse, raptors, and other wildlife resulting from project-related habitat loss and fragmentation, fence construction, increased vehicular traffic, and noise.
- Potential increases in traffic and associated impacts on existing county, state, and Bureau of Land Management (BLM) roads and highways.
- Potential social and economic impacts to local communities and the State of Wyoming.
- Potential adverse impacts to surface and ground water resources due to the release of poor quality ground water to existing surface water resources, including the Medicine Bow River and the North Platte River system.
- Potential adverse impacts to sensitive soils within the Hanna Draw Exploration Project Area (HDEPA).
- Potential adverse impacts to air quality resulting from emissions associated with additional drilling and production activities and compressor station operation.
- Potential for unsuccessful reclamation of disturbed areas.
- Potential conflicts with agricultural operations, including livestock grazing, in HDEPA vicinity.
- Potential impacts to cultural and historical values.
- Potential impacts to threatened, endangered, proposed, and sensitive plant and animal species, including those found downstream in the North Platte River.
- Cumulative impacts of drilling and development activities when combined with other proposed and ongoing developments on lands in the vicinity of the HDEPA.
- Potential conflicts between mineral development activities and recreational opportunities.
- Potential adverse impacts to visual resources.
- Potential impacts to multiple use of BLM lands, including a reduction in access and aesthetic values for hunters.
- Loss of open space.
- Potential impacts of dewatering coal beds on water levels in wells.

- Increased likelihood of underground fires in dewatered coal beds.
- Potential for invasion of undesirable plant species, especially cheatgrass.
- Potential for water depletions in the North Platte River.
- Potential for methane contamination of shallow aquifers.
- Potential impacts to wetlands and riparian areas, including opportunities to create wetlands.
- Protection of paleontological resources.
- Potential air quality impacts to U.S. Forest Service (USFS) wilderness areas.
- Potential use of produced water for irrigation/new cropland development which could adversely affect certain wildlife species.
- Failure of the Resource Management Plan to consider coalbed methane development.
- Potential adverse impacts to the environment from spills, accidents, and impoundment breaches.
- Need for National Pollution Discharge Elimination System (NPDES) discharge and storm water permits.
- Potential adverse impacts to soils due to compaction and accelerated erosion, including that caused by discharge of produced water.
- Estimates of aquifer recharge potential.
- Concerns for road design as it relates to safety.

APPENDIX B:

WATER MANAGEMENT PLAN

HANNA DRAW COALBED METHANE EXPLORATION PROJECT
WILLIAMS PRODUCTION RMT COMPANY

WATER MANAGEMENT PLAN

LANDS INVOLVED:
T23N, R81W, SECTIONS 12, 13, AND 14

Prepared by

Williams Production RMT Company
Denver, Colorado

Williams Production RMT Company's (Williams's) proposed Hanna Draw Coalbed Methane (CBM) Exploration Project (Project) is located approximately 10 mi northeast of Hanna, Wyoming, in Carbon County. This proposed Project consists of up to nine federal mineral wells and up to 16 wells on private land within the Medicine Bow River drainage (see Figure 1.1 in the EA). The total number of wells to be drilled as part of the proposed project will not exceed 25. The proposed wells involve minerals that are administered by the Bureau of Land Management (BLM), Rawlins Field Office.

Drilling and water production will determine whether CBM production can be established in Hanna Draw. Unproductive well holes will be plugged and abandoned as soon as practicable after the conclusion of production testing. Wells capable of production will be tested for up to 18 months using a total containment reservoir as discussed later in this document. Sundry Notices (Form 3160–5) will be submitted to the BLM for production activities and facilities.

Name, number, and location information for the 16 potential wells, nine existing wells, and seven contingency well locations is listed in Table B.1.

1. STATE OF WYOMING REQUIREMENTS

Williams has applied for and received Reservoir Permit 11084R to appropriate surface water from the Wyoming State Engineer's Office (WSEO). In addition, Williams has applied to the Wyoming Department of Environmental Quality (WDEQ) for a National Pollutant Discharge Elimination System (NPDES) permit to discharge produced water. Any other necessary ground water or surface water permits determined to be necessary will be obtained. No new reservoirs, downstream diversions, or modifications to existing reservoirs are planned.

2. WATER MANAGEMENT PLAN

The Hanna CBM Exploration Project is a drilling and testing program involving up to 25 CBM well sites located in the Hanna Draw watershed (see Figure 1.1 in the EA). Water from the

Table B.1 Name, Number, and Location Information for Potential Wells.

Name	Number	Qtr/Qtr Location
Hanna Draw Unit	20	SWSW Section 7, T23N, R80W
Hanna Draw Unit	27	NESE Section 11, T23N, R81W
Hanna Draw Unit	28	SWSE Section 11, T23N, R81W
Hanna Draw Unit	29	SESW Section 11, T23N, R81W
Hanna Draw Unit	30	SWSW Section 11, T23N, R81W
Hanna Draw Unit	36	SWNE Section 11, T23N, R81W
Hanna Draw Unit	37	NENE Section 11, T23N, R81W
Hanna Draw Unit	39	NENW Section 11, T23N, R81W
Hanna Draw Unit	24	SWSE Section 12, T23N, R81W
Hanna Draw Unit	25	NESW Section 12, T23N, R81W
Hanna Draw Unit	26	SWSW Section 12, T23N, R81W
Hanna Draw Unit	86	SWNW Section 12, T23N, R81W
Hanna Draw Unit	87	NENW Section 12, T23N, R81W
Hanna Draw Unit	88	SWNE Section 12, T23N, R81W
Hanna Draw Unit	21	NENE Section 13, T23N, R81W
Hanna Draw Unit	22	SWNE Section 13, T23N, R81W
Hanna Draw Unit	31	NENE Section 14, T23N, R81W
Hanna Draw Unit	32	SWNE Section 14, T23N, R81W
Hanna Draw Unit	33	NENW Section 14, T23N, R81W
Hanna Draw Unit	46	SWSE Section 33, T24N, R81W
Hanna Draw Unit	41	SWSE Section 35, T24N, R81W
Hanna Draw Unit	42	SESE Section 35, T24N, R81W
Hanna Draw Unit	43	NWNE Section 35, T24N, R81W
Hanna Draw Unit	44	NWSE Section 35, T24N, R81W
Hanna Draw Unit	45	SENE Section 35, T24N, R81W
Hanna Draw Unit	1	SWSW Section 13, T23N, R81W
Hanna Draw Unit	9	NWSW Section 13, T23N, R81W
Hanna Draw Unit	10	NESW Section 13, T23N, R81W
Hanna Draw Unit	14	SWNW Section 35, T24N, R81W
Hanna Draw Unit	16	NWNW Section 13, T23N, R81W
Hanna Draw Unit	18	SWNW Section 13, T23N, R81W
Hanna Draw Unit	19	SENW Section 13, T23N, R81W

wells will be conveyed to an earthen surface impounded reservoir located in the E½ of Section 13.

Water Production and Storage

Based on limited data from seven test wells, the maximum initial water discharge rate from each well would be about 550 bpd. The water discharge rate is expected to decrease to about 350 bpd per well during the first 18 months of pumping of each well. Assuming that the 25 wells are phased in over the first 12 months of the exploration program and that water production in each well declines linearly, the total volume of water produced during the exploration program would be 593 acre-feet.

The amount of water produced will depend on the rate at which wells are drilled and the amount of water produced by each well. However, Williams has been pumping seven wells for many months and, based on the data from these seven wells, is confident that the assumption that initial production (550 bbls/day) will decline linearly to 350 bbls/day. TRC Mariah Associates Inc. independently evaluated several scenarios (e.g., putting all 25 wells into production in the first 12 months) and verified that Williams's estimate that 593 acre-ft would be produced over the 18-month exploration project is reasonable, based on the present data.

Williams constructed a reservoir, as shown in Figure 1.1 in the EA, in late 2000 to contain all produced water associated with the exploration program. The reservoir's total available capacity is 500 acre-feet, while maintaining a freeboard of 5 feet. The surface area of the reservoir at this level is 46.35 acres.

The adequacy of this reservoir to meet the produced water storage requirements for the exploration project was determined by considering the above well inflow rates and estimated rates of infiltration, evaporation, precipitation, and surface runoff.

Infiltration rates are conservatively assumed to be negligible.

The pan evaporation rate for the project area is about 60 inches, while reservoir evaporation, representing anticipated conditions, is approximately 42 inches. Assuming an average surface area of 35 acres, 183.8 acre-feet of water would be evaporated during the 18-month exploration phase.

The average annual precipitation for this area, based on 49 years of data for the Rawlins Airport's weather station, is 9.29 inches. Therefore, 53.82 acre-ft of water would be added through precipitation.

Runoff to the reservoir during the 25-year/24-hour point precipitation event (2.0 inches based on the National Oceanic and Atmospheric Atlas 2, Volume II) was estimated using the National Resource Conservation Service's TR55 method. The total runoff volume for the 25-year storm event (assumed to occur once during the 18-month exploration project) is estimated to be 13.2 acre-feet from the 114.2 acres tributary to the reservoir site. However, collection ditches will be constructed above the reservoir to route runoff away from the reservoir and into the downstream drainages. This calculated runoff amount is based upon the following assumptions:

- the area below the 6,920-ft contour is assumed to have a CN value of 100 (i.e., all rainfall becomes runoff); and
- the area above the 6,920-ft contour is assumed to have a CN value equal to 85 using type D soils with sage cover in poor hydrologic condition.

Using the above data, the reservoir water balance is shown in Figure B.1.

The calculations indicate that the volume of produced water will not exceed the capacity of the reservoir. However, if at any time it appears that the reservoir capacity will be exceeded, Williams will implement management options that will prevent the need to discharge water from the reservoir. These options include shutting in wells or reducing the rate of water discharge in one or more wells. Either of these actions would slightly reduce the amount of information Williams may obtain concerning the productivity of a given well but would not adversely affect its ability to assess the field for possible production.

Figure B.1 Reservoir Water Balance.

Water Quality

A composite sample of the six currently producing Hanna Draw wells on fee land was collected and analyzed. These results are summarized and compared with Wyoming groundwater quality standards in Table 3.5 in the EA. The data indicate that the water is suitable for livestock, wildlife, and aquatic life, the only uses contemplated for the stored water, and treatment of the water will not be necessary. The terms and conditions of the permits issued by the WSEO donot require monitoring. The NPDES permit will require monitoring consistent with protecting the designated uses of the reservoir.

Water Transport

Water will be conveyed to the reservoir mentioned above by way of one or two 12-inch buried polyethylene trunkline. The line will surface and outfall above the high water line of the reservoir onto a shallow concave channel that will be rip-rapped to prevent erosion. Each well will interconnect with the 12-inch trunkline by way of one 6-inch buried polyethylene gathering line.

Location and Type of Water Supply for Drilling

Water for drilling the proposed wells will probably be derived from CBM wells that are currently producing on private land adjacent to the federal project lands. The procurement of water will be the responsibility of the drilling contractor. It is estimated that 6,000 barrels of water will be required for drilling each well.

Water Facilities, Including Impoundments

The reservoir will be used to store water only during the 18-month exploration phase of the project. Water in the reservoir will be allowed to evaporate. The private landowner may wish to maintain a reservoir for stock watering, in which case Williams will lower the dam so that

the reservoir's size is more appropriate for use as a stock pond. If the landowner does not wish to use the reservoir, the dam will be removed after all water had evaporated, and the area would be reclaimed.

As noted above, the reservoir has a total available capacity of 500 acre-ft. The relationship between water elevation, reservoir area, and total storage is presented in Table 2.2 in the EA.

Any other water facilities that provide for the beneficial use of produced water from federal wells will be designed site-specifically, using best management practices, to accommodate livestock access to water, to control erosion, and to limit sedimentation. However, at present, there are no plans for water facilities, such as stock tanks, or new stock reservoirs, other than possibly converting the reservoir to a smaller stock reservoir.

APPENDIX C:

NPDES PERMIT

Jim Geringer,
Governor

**The State
of Wyoming**

Department of Environmental Quality

Herschler Building • 122 West 25th Street • Cheyenne, Wyoming 82002

ADMIN/OUTREACH	ABANDONED MINES	AIR QUALITY	INDUSTRIAL SITING	LAND QUALITY	SOLID & HAZ. WASTE	WATER QUALITY
307-777-7758	307-777-6145	307-777-7391	307-777-7369	307-777-7756	307-777-7752	307-777-7781
FAX 777-3610	FAX 777-6462	FAX 777-5616	FAX 777-6937	FAX 777-5864	FAX 777-5973	FAX 777-5973

STATEMENT OF BASIS

New

APPLICANT NAME: Williams Production RMT Company

MAILING ADDRESS: 724 Commercial Drive, Suite 100
Gillette, WY 82716

FACILITY LOCATION: Hanna Southern Pilot which is located in the E1/2, Section 13, Township 23 North, Range 81 West, Carbon County. The wastewater will be discharged to and contained in a reservoir (Hanna Pilot Reservoir) which has been constructed on the hydrologic divide separating Hanna Draw and Pine Draw. The nearest class 2 water is the Medicine Bow River (class 2AB) which is 5 miles via Hanna Draw and 9.7 miles via Pine Draw from the point of discharge.

NUMBER: WY0044164

This facility is a typical coal bed methane production facility in which groundwater is pumped from a coal bearing formation resulting in the release of methane from the coal bed. The permit authorizes the discharge to the surface of groundwater produced in this way provided the effluent quality is in compliance with effluent limits that are established by this permit. In developing effluent limits, all federal and state regulations and standards have been considered and the most stringent requirements incorporated into the permit. The EPA Effluent Guidelines and Standards for Oil and Gas Extraction Point Source Category (Part 435, Subpart E) predate the development of coal bed methane extraction technology; however, the technology is similar enough to conventional gas extraction that, in the professional judgement of the WDEQ, this effluent limit guideline is appropriately applied to coal bed methane gas production. The guideline limits oil and grease effluent concentrations to less than 35 mg/l and requires that discharges of produced water be used to enhance agricultural production and/or wildlife propagation. This permit does not cover activities associated with discharges of drilling fluids, acids, stimulation waters or other fluids derived from the drilling or completion of the wells.

The permit is being issued with the conditions described under option 1B of the coal bed methane permitting options defined in DEQ's Coal Bed Methane NPDES Guidance Document dated August, 2001. Under this permitting option, the produced water will be contained in a closed basin, playa or reservoir (class 3) that will not flow into any other waters of the state. The permittee has demonstrated through a water balance study that, considering CBM well inflow, natural precipitation, evaporation and infiltration, the reservoir will be adequate to contain all CBM discharge water and storm water up to a 25 year 24 hour event. In addition, the permittee has committed to the complete containment of all discharged water. The permit establishes effluent limits which are protective of Class 3 standards.

Permit effluent limits are based on federal and state regulations and are effective as of the date of issuance. The permit limits total petroleum hydrocarbons to 10 mg/l and pH must remain between 6.5 and 8.5 standard units. Effluent limits for fluoride (2 mg/l), sodium (2000 mg/l), total dissolved solids (5,000 mg/l), and sulfates (3,000 mg/l) are included as protection for stock and wildlife. The effluent limits for fluoride and sodium must be met by water contained in the Hanna Pilot Reservoir. An effluent limit is established for radium 226 of 60 pCi/l in the reservoir. Additionally, effluent limits for aquatic life protection are included for dissolved iron (1000 ug/l), chloride (230 mg/l), total recoverable aluminum (87 ug/l), total recoverable selenium (5 ug/l), dissolved

arsenic (150 ug/l), and free cyanide (5 ug/l). These limits must be achieved by water contained in the reservoir. Limits established for protection of aquatic life are also considered to be protective for stock and wildlife watering. The effluent limits are based upon information contained in *Mineral Tolerance of Domestic Animals*, (National Academy of Sciences-Subcommittee on Mineral Toxicity in Animals, Washington, D.C., 1980), and Wyoming Water Quality Rules and Regulations, Chapters 1 and 7.

Although the Hanna Pilot Reservoir is constructed within the Medicine Bow River Drainage (class 2AB), the identified uses associated with the discharge are limited to agriculture (stock watering), wildlife, and aquatic life as a result of the permittee's commitment to contain all discharged water within the class 3 system. For this reason, the permit also includes a requirement that the water discharged, including all intercepted precipitation runoff, be contained within the reservoir. The permit prohibits any discharge of water from the reservoir.

There shall be no discharge of floating solids or visible foam in other than trace amounts, nor shall the discharge cause formation of visible deposits of iron, hydrocarbons or any other constituent on the bottom or shoreline of the receiving water. In addition, erosion control measures will be implemented to prevent significant damage to or erosion of the receiving water channel at the point of discharge.

The discharge of wastewater and the effluent limits that are established in this permit have been reviewed to ensure that the levels of water quality necessary to protect the designated uses of the receiving waters are maintained and protected. An antidegradation review has been conducted and verifies that the permit conditions, including the effluent limitations established, provide a level of protection to the receiving water consistent with the antidegradation provisions of Wyoming surface water quality standards.

Self monitoring of effluent quality and quantity is required on a regular basis with reporting of results semiannually. The permit is scheduled to expire on November 27, 2006. This expiration date is established based on the storage capacity for the Hanna Pilot Reservoir of three to four years, as estimated by the applicant.

Maggie Davison
Water Quality Division
Department of Environmental Quality
August 23, 2001

AUTHORIZATION TO DISCHARGE UNDER THE

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, (hereinafter referred to as "the Act"), and the Wyoming Environmental Quality Act,

Barrett Resources Corporation

is authorized to discharge from the wastewater treatment facilities serving the

Hanna Southern Pilot

located in

the E1/2, Section 13, Township 23 North, Range 81 West, Carbon County

to receiving waters named

Hanna Pilot Reservoir (class 4 water) which has been constructed on the hydrologic divide separating Hanna Draw and Pine Draw. The nearest class 2 water is the Medicine Bow River

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II and III hereof.

This permit shall become effective on the date of issuance.

This permit and the authorization to discharge shall expire at midnight, November 27, 2006.

_____ November 28, 2001

Gary Beach Date
Administrator - Water Quality

_____ November 28, 2001

Dennis Hemmer Date
Director - Department of Environmental Quality

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

Effective immediately and lasting through November 27, 2006, the quality of effluent discharged by the permittee shall, at a minimum, meet the limitations set forth below. The permittee is authorized to discharge from outfalls(s) serial number(s) 001.

1. Such discharges shall be limited as specified below:

Effluent Characteristic	Effluent Limits Daily Maximum Outfall 001** or Hanna Pilot Reservoir***
Chlorides, mg/l	230***
Sulfates, mg/l	3000**
Total Dissolved Solids, mg/l	5000**
Total Petroleum Hydrocarbons (TPH), mg/l*	10**
Total Radium 226, pCi/l	60***
Dissolved Arsenic, ug/l	150***
Fluoride, mg/l	2.0***
Total Recoverable Selenium, ug/l	5.0***
Dissolved Iron, ug/l	1000***
Total Recoverable Aluminum, ug/l	87***
Free Cyanide, ug/l	5***
Sodium, mg/l	2000***

*Acceptable method for this parameter is EPA SW846 Method 8015 (modified) for Total Extractable Petroleum Hydrocarbons.

The pH shall not be less than 6.5 standard units nor greater than 8.5 standard units in any single grab sample and shall be measured at the discharge point.

All CBM produced water shall be contained within the Hanna Pilot Reservoir. Discharge from the Hanna Pilot Reservoir is prohibited under this permit.

There shall be no discharge of floating solids or visible foam in other than trace amounts, nor shall the discharge cause formation of a visible sheen or visible hydrocarbon deposits on the bottom or shoreline of the receiving water.

All waters shall be discharged in a manner to prevent erosion, scouring, or damage to stream banks, stream beds, ditches, or other waters of the state at the point of discharge. In addition, there shall be no deposition of substances in quantities which could result in significant aesthetic degradation, or degradation of habitat for aquatic life, plant life or wildlife; or which could adversely affect public water supplies or those intended for agricultural or industrial use.

2. Discharges shall be monitored by the permittee as specified below:

a. Monitoring of the initial discharge

Within 30 days of commencement of discharge, a sample shall be collected from each outfall and analyzed for the constituents specified below, noting the required detection limits. Within 90 days of commencement of discharge, a summary report on the produced water must be submitted to the Wyoming Department of Environmental Quality and the U.S. EPA Region 8 at the addresses listed below. This summary report must include the results and detection limits for each of the constituents. In addition, the report must include written notification of the established location of the discharge point (refer to Part I.B.11). This notification must include a confirmation that the location of the established discharge point(s) is within 1,510 feet of the location of the identified discharge point(s), is within the same drainage, and discharges to the same landowner's property as identified on the original application form. The legal description and location in decimal degrees of the established discharge point(s) must also be provided. After receiving the monitoring results for the initial discharge, the routine monitoring requirements described in Part I.A.2.b. may be modified to require more stringent monitoring.

Parameter	Required Detection Limit	Sample Type
Total Recoverable Aluminum	50 µg/l	Grab
Bicarbonate	1 mg/l	Grab
Dissolved Cadmium	0.1 µg/l	Grab
Calcium	as me/l	Grab
Chlorides	5 mg/l	Grab
Dissolved Chromium	1 µg/l	Grab
Dissolved Copper	1 µg/l	Grab
Cyanide (free)	5 µg/l	Grab
Dissolved Boron	0.1 mg/l	Grab
Dissolved Iron	30 µg/l	Grab
Dissolved Manganese	10 µg/l	Grab
Flow Volume	± 10% of actual volume	Monthly Total
Fluoride	0.1 mg/l	Grab
Hardness	10 mg/l as $CaCO_3$	Grab
Dissolved Lead	2 µg/l	Grab
Magnesium	as me/l	Grab
Mercury	0.06 µg/l	Grab
Dissolved Nickel	10 µg/l	Grab
pH	to 0.1 pH unit	Grab
Phenol	10 µg/l	Grab
Potassium	1 mg/l	Grab
Radium 226	0.2 pCi/l	Grab
Total Recoverable Selenium	2 µg/l	Grab
Dissolved Silver	3 µg/l	Grab
Sodium	5 mg/l	Grab
Sodium Absorption Ratio	not applicable	Calculated

Parameter	Required Detection Limit	Sample Type
Specific Conductance	5 micromhos/cm	Grab
Sulfates	10 mg/l	Grab
Total Alkalinity	1 mg/l as $CaCO_3$	Grab
Dissolved Arsenic	1 µg/l	Grab
Total Petroleum Hydrocarbons*	1 mg/l	Grab
Dissolved Zinc	10 µg/l	Grab

*Acceptable method for this parameter is EPA SW846 Method 8015 (modified) for Total Extractable Petroleum Hydrocarbons.

Initial monitoring reports are to be sent to the following addresses:

Planning and Targeting Program, 8ENF-PT
Office of Enforcement, Compliance, and Environmental Justice
U.S. EPA Region 8
999 18th St., Suite 300
Denver, CO 80202-2466

and

Wyoming Department of Environmental Quality
Water Quality Division
Herschler Building, 4 West
122 West 25th Street
Cheyenne, WY 82002

b. Routine monitoring

Outfall 001

For the duration of the permit, at a minimum, samples for the constituents described below shall be collected at the indicated frequencies. The first routine monitoring for the time frame during which the monitoring of initial discharge occurs will, at a minimum, consist of flow measurements for the duration of the six-month monitoring time frame. Monitoring will be based on semi-annual time frames, from January through June, and from July through December.

Parameter	Measurement Frequency	Sample Type
Total Flow - (MGD)	Monthly	Continuous
Total Petroleum Hydrocarbons	Quarterly	Visual
Dissolved Iron	Quarterly	Grab
Chloride	Quarterly	Grab
pH	Quarterly	Grab
Radium 226	Quarterly	Grab
Total Dissolved Solids	Quarterly	Grab
Dissolved Arsenic	Quarterly	Grab
Total Recoverable Aluminum	Quarterly	Grab

Parameter	Measurement Frequency	Sample Type
Fluoride	Quarterly	Grab
Total Recoverable Selenium	Quarterly	Grab
Free Cyanide	Quarterly	Grab
Sodium	Quarterly	Grab
Sulfate	Quarterly	Grab

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the outfall of the final treatment unit which is located out of the natural drainage and prior to admixture with diluent waters.

Hanna Pilot Reservoir

For the duration of the permit, at a minimum, samples for the constituents described below shall be collected at the indicated frequencies. Monitoring will be based on semi-annual time frames, from January through June, and from July through December.

Parameter	Measurement Frequency	Sample Type
Dissolved Iron	Quarterly	Grab
Chloride	Quarterly	Grab
Radium 226	Quarterly	Grab
Dissolved Arsenic	Quarterly	Grab
Total Recoverable Aluminum	Quarterly	Grab
Fluoride	Quarterly	Grab
Total Recoverable Selenium	Quarterly	Grab
Free Cyanide	Quarterly	Grab
Sodium	Quarterly	Grab

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): From the southeast end of water contained in the Hanna Pilot Reservoir.

MONITORING AND REPORTING

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and approval by, the permit issuing authority.

2. Reporting

Results of initial monitoring shall be summarized on a Monitoring Report Form for Monitoring of Initial Discharge and submitted to the state water pollution control agency at the address below postmarked not later than 90 days after the commencement of discharge.

Results of routine monitoring shall be summarized and reported on a Discharge Monitoring Report Form (DMR). The information submitted on the first six-month DMR shall contain a summary of flow measurements and any additional monitoring conducted subsequent to the submittal of the initial monitoring report. Whole effluent toxicity (biomonitoring) results must be reported on the most recent version of EPA Region VIII's Guidance for Whole Effluent Reporting. Monitoring reports must be submitted to the state water pollution control agency at the following address postmarked no later than the 28th day of the month following the completed reporting period. The first report is due on January 28, 2002.

Legible copies of these, and all other reports required herein, shall be signed and certified in accordance with the Signatory Requirements contained in Part II.A.11.

Wyoming Department of Environmental Quality
Water Quality Division
Herschler Building, 4 West
122 West 25th Street
Cheyenne, WY 82002
Telephone: (307) 777-7781

If no discharge occurs during the reporting period, "no discharge" shall be reported. If discharge is intermittent during the reporting period, sampling shall be done while the facility is discharging.

3. Definitions

a. The "monthly average" shall be determined by calculating the arithmetic mean (geometric mean in the case of fecal coliform) of all composite and/or grab samples collected during a calendar month.

b. The "weekly average" shall be determined by calculating the arithmetic mean (geometric mean in the case of fecal coliform) of all composite and/or grab samples collected during any week.

c. The "daily maximum" shall be determined by the analysis of a single grab or composite sample.

d. "MGD", for monitoring requirements, is defined as million gallons per day.

e. "Net" value, if noted under Effluent Characteristics, is calculated on the basis of the net increase of the individual parameter over the quantity of that same parameter present in the intake water measured prior to any contamination or use in the process of this facility. Any contaminants contained in any intake water obtained from underground wells shall not be adjusted for as described above and, therefore, shall be considered as process input to the final effluent. Limitations in which "net" is not noted are calculated on the basis of gross measurements of each parameter in the discharge, irrespective of the quantity of those parameters in the intake waters.

f. A "composite" sample, for monitoring requirements, is defined as a minimum of four grab samples collected at equally spaced two hour intervals and proportioned according to flow.

g. An "instantaneous" measurement for monitoring requirements is defined as a single reading, measurement, or observation.

h. A "pollutant" is any substance or substances which, if allowed to enter surface waters of the state, causes or threatens to cause pollution as defined in the Wyoming Environmental Quality Act, Section 35-11-103.

i. "Total Flow" is the total volume of water discharged, measured on a continuous basis and reported as a total volume for each month during a reporting period. The accuracy of flow measurement must comply with Part III.A.1.

4. Test Procedures

Test procedures for the analysis of pollutants, collection of samples, sample containers, sample preservation, and holding times, shall conform to regulations published pursuant to 40 CFR, Part 136, unless other test procedures have been specified in this permit.

5. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date and time of sampling;

b. The dates and times the analyses were performed;

c. The person(s) who performed the analyses and collected the samples;

d. The analytical techniques or methods used; and

e. The results of all required analyses including the bench sheets, instrument readouts, computer disks or tapes, etc., used to determine the results.

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form. Such increased frequency shall also be indicated.

7. Records Retention

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the administrator at any time. Data collected on site, copies of Discharge Monitoring Reports and a copy of this NPDES permit must be maintained on site during the duration of activity at the permitted location.

8. Penalties for Tampering

The Act provides that any person who falsifies, tampers with or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years per violation, or both.

9. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any Compliance Schedule of this permit shall be submitted no later than 14 days following each schedule date.

10. Facility Identification

All facilities discharging produced water shall be clearly identified with an all-weather sign posted at each discharge point and sampling location. This sign shall, as a minimum, convey the following information:

a. The name of the company, corporation, person(s) who holds the discharge permit, and the NPDES permit number;

b. The contact name and phone number of the person responsible for the records associated with the permit;

c. The name of the facility (lease, well number, etc.) and the outfall number or sampling location as identified by the discharge permit.

11. Identification and Establishment of Discharge Points

According to 40 CFR 122.21(k)(1), the permittee shall identify the expected location of each discharge point on the appropriate NPDES permit application form. The location of the discharge point must be identified to within an accuracy of 15 seconds. This equates to a distance of 1,510 feet.

In order for the permit not to be subjected to additional public notice, the location of the established discharge point must be within 1,510 feet of the location of the discharge point originally identified on the permit application. In addition, the discharge must be within the same drainage and must discharge to the same landowner's property as identified on the original application form. If the three previously stated requirements are not satisfied, modification of the discharge point location(s) constitutes a major modification of the permit as defined in Part I.B.12. The permittee shall provide written notification of the establishment of each discharge point in accordance with Part I.A.2.a above.

12. Location of Discharge Points

As of the date of permit issuance, authorized points of discharge were as follows:

001- The outfall which is located in the NWSE Section 13, Township 23 North, Range 81 West. Discharge from all the wells listed in the attached table will be piped together and discharged to the Hanna Pilot Reservoir. The latitude is 41.57'54" and the longitude is 106.28'17".

Requests for modification of the above list will be processed as follows. If the requested modification satisfies the definition of a minor permit modification as defined in 40 CFR 122.63 modifications will not be required to be advertised in a public notice. A minor modification constitutes a correction of a typographical error, increase in monitoring and/or reporting, revision to an interim compliance schedule date, change in ownership, revision of a construction schedule for a new source discharger, deletion of permitted outfalls, and/or the incorporation of an approved local pretreatment program.

A request for a minor modification must be initiated by the permittee by completing the form titled National Pollutant Discharge Elimination System Permit Modification Application For Coal Bed Methane. Incomplete application forms will be returned to the applicant.

PART II

A. MANAGEMENT REQUIREMENTS

1. Changes

The permittee shall give notice to the administrator of the Water Quality Division as soon as possible of any physical alterations or additions to the permitted facility. Notice is required when:

a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source as determined in 40 CFR 122.29 (b); or

b. The alteration or addition could change the nature or increase the quantity of pollutants discharged.

2. Noncompliance Notification

a. The permittee shall give advance notice of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

b. The permittee shall report any noncompliance which may endanger health or the environment as soon as possible, but no later than 24 hours from the time the permittee first became aware of the circumstances. The report shall be made to the Water Quality Division, Wyoming Department of Environmental Quality at (307) 777-7781.

c. A written submission shall be provided within five (5) days of the time that the permittee becomes aware of a noncompliance circumstance as described in paragraph c. above.

The written submission shall contain:

(1) A description of the noncompliance and its cause;

(2) The period of noncompliance, including exact dates and times;

(3) The estimated time noncompliance is expected to continue if it has not been corrected; and

(4) Steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance.

d. The following occurrences of unanticipated noncompliance shall be reported by telephone to the Water Quality Division, Watershed Management Section, NPDES Program (307) 777-7781 by the first workday following the day the permittee became aware of the circumstances.

(1) Any unanticipated bypass which exceeds any effluent limitation in the permit;

(2) Any upset which exceeds any effluent limitation in the permit; or

(3) Violation of a maximum daily discharge limitation for any of the pollutants listed in the permit.

e. The administrator of the Water Quality Division may waive the written report on a case-by-case basis if the oral report has been received within 24 hours by the Water Quality Division, Watershed Management Section, NPDES Program (307) 777-7781.

f. Reports shall be submitted to the Wyoming Department of Environmental Quality at the address in Part I under Reporting and to the Planning and Targeting Program, 8ENF-PT, Office of Enforcement, Compliance, and Environmental Justice, U.S. EPA Region 8, 999 18th St., Suite 300, Denver, CO 80202-2466.

g. The permittee shall report all instances of noncompliance that have not been specifically addressed in any part of this permit at the time the monitoring reports are due.

3. Facilities Operation

The permittee shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the permittee only when the operation is necessary to achieve compliance with the conditions of the permit. However, the permittee shall operate, as a minimum, one complete set of each main line unit treatment process whether or not this process is needed to achieve permit effluent compliance.

4. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to waters of the state resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. Bypass of Treatment Facilities

a. Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

b. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs c. and d. of this section. Return of removed substances to the discharge stream shall not be considered a bypass under the provisions of this paragraph.

c. Notice:

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice at least 60 days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required under Part II.A.2.

d. Prohibition of bypass.

(1) Bypass is prohibited and the administrator of the Water Quality Division may take enforcement action against a permittee for a bypass, unless:

(a) The bypass was unavoidable to prevent loss of life, personal injury or severe property damage;

(b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment

should have been installed to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(c) The permittee submitted notices as required under paragraph c. of this section.

e. The administrator of the Water Quality Division may approve an anticipated bypass, after considering its adverse effects, if the administrator determines that it will meet the three conditions listed above in paragraph d. (l) of this section.

6. Upset Conditions

a. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improper designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations if the requirements of paragraph c. of this section are met.

c. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required under Part II.A.2; and

(4) The permittee complied with any remedial measures required under Part II.A.4.

d. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

7. Removed Substances

Solids, sludges, filter backwash or other pollutants removed in the course of treatment or control of wastewaters or intake waters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering waters of the state.

8. Power Failures

In order to maintain compliance with the effluent limitations and prohibitions of this permit, the permittee shall either:

a. In accordance with a schedule of compliance contained in Part I, provide an alternative power source sufficient to operate the wastewater control facilities; or

b. If such alternative power source as described in paragraph a. above is not in existence and no date for its implementation appears in Part I, take such precautions as are necessary to maintain and operate the facility under its control in a manner that will minimize upsets and insure stable operation until power is restored.

9. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the federal act and the Wyoming Environmental Quality Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The permittee shall give the administrator of the Water Quality Division advance notice of any planned changes at the permitted facility or of any activity which may result in permit noncompliance.

10. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

11. Signatory Requirements

All applications, reports or information submitted to the administrator of the Water Quality Division shall be signed and certified.

a. All permit applications shall be signed as follows:

(1) For a corporation: by a responsible corporate officer;

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively;

(3) For a municipality, state, federal or other public agency: by either a principal executive officer or ranking elected official.

b. All reports required by the permit and other information requested by the administrator of the Water Quality Division shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described above and submitted to the administrator of the Water Quality Division; and

(2) The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility or an individual or position having overall responsibility for environmental matters for the company. A duly authorized representative may thus be either a named individual or any individual occupying a named position.

c. If an authorization under paragraph II.A.11.b. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph II.A.11.b must be submitted to the administrator of the Water Quality Division prior to or together with any reports, information or applications to be signed by an authorized representative.

d. Any person signing a document under this section shall make the following certification:

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant

penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

B. RESPONSIBILITIES

1. Inspection and Entry

The permittee shall allow the administrator of the Water Quality Division or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this permit; and

d. Sample or monitor, at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the federal act, any substances or parameters at any location.

2. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharges emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the regional administrator of the Environmental Protection Agency and the administrator of the Water Quality Division. The administrator of the Water Quality Division shall then provide written notification to the new owner or controller of the date in which they assume legal responsibility of the permit. The permit may be modified or revoked and reissued to change the name of the permittee and incorporate such other requirements as described in the federal act.

3. Availability of Reports

Except for data determined to be confidential under Section 308 of the federal act, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Wyoming Department of Environmental Quality and the regional administrator of the Environmental Protection Agency. As required by the federal act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the federal act.

4. Toxic Pollutants

The permittee shall comply with effluent standards or prohibitions established under Section 307 (a) of the federal act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

5. Changes in Discharge of Toxic Substances

Notification shall be provided to the administrator of the Water Quality Division as soon as the permittee knows of, or has reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) One hundred micrograms per liter (100 µg/l);

(2) Two hundred micrograms per liter (200 µg/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/1) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21 (g) (7); or

(4) The level established by the director of the Environmental Protection Agency in accordance with 40 CFR 122.44 (f).

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 µg/l);

(2) One milligram per liter (1 mg/1) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21 (g) (7); or

(4) The level established by the director of the Environmental Protection Agency in accordance with 40 CFR 122.44 (f).

6. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. As long as the conditions related to the provisions of "Bypass of Treatment Facilities" (Part II.A.5), "Upset Conditions" (Part II.A.6), and "Power Failures" (Part II.A.8) are satisfied then they shall not be considered as noncompliance.

7. Need to Halt or Reduce Activity not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

8. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities or penalties to which the permittee is or may be subject under Section 311 of the federal act.

9. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities or penalties established pursuant to any applicable state or federal law or regulation. In addition, issuance of this permit does not substitute for any other permits required under the Clean Water Act or any other federal, state, or local law.

10. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights nor any infringement of federal, state or local laws or regulations.

11. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application should be submitted at least 180 days before the expiration date of this permit.

12. Duty to Provide Information

The permittee shall furnish to the administrator of the Water Quality Division, within a reasonable time, any information which the administrator may request to determine whether cause exists for modifying, revoking and reissuing or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the administrator, upon request, copies of records required by this permit to be kept.

13. Other Information

When the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or any report to the administrator of the Water Quality Division, it shall promptly submit such facts or information.

14. Permit Action

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

PART III

A. OTHER REQUIREMENTS

1. Flow Measurement

At the request of the administrator of the Water Quality Division, the permittee must be able to show proof of the accuracy of any flow measuring device used in obtaining data submitted in the monitoring report. The flow measuring device must indicate values of within plus or minus ten (10) percent of the actual flow being measured.

2. 208(b) Plans

This permit may be modified, suspended or revoked to comply with the provisions of any 208(b) plan certified by the Governor of the State of Wyoming.

3. Reopener Provision

This permit may be reopened and modified (following proper administrative procedures) to include the appropriate effluent limitations (and compliance schedule, if necessary) or other appropriate requirements if one or more of the following events occurs:

a. The state water quality standards of the receiving water(s) to which the permittee discharges are modified in such a manner as to require different effluent limits than contained in this permit;

b. A total maximum daily load (TMDL) is developed and approved by the state and/or the Environmental Protection Agency which specifies a wasteload allocation for incorporation in this permit;

c. A revision to the current water quality management plan is approved and adopted which calls for different effluent limitations than contained in this permit;

d. Downstream impairment is observed and the permitted facility is contributing to the impairment;

e. The limits established by the permit no longer attain and/or maintain applicable water quality standards;

f. The permit does not control or limit a pollutant that has the potential to cause or contribute to a violation of a state water quality standard.

g. If new applicable effluent guidelines and/or standards have been promulgated and the standards are more stringent than the effluent limits established by the permit.

4. Permit Modification

After notice and opportunity for a hearing, this permit may be modified, suspended or revoked in whole or in part during its term for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge; or

d. If necessary to comply with any applicable effluent standard or limitation issued or approved under Sections 301(b) (2) (C) and (D), 304 (b) (2) and 307 (a) (2) of the federal act, if the effluent standard or limitation so issued or approved:

(1) Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

(2) Controls any pollutant not limited in the permit.

5. Toxicity Limitation - Reopener Provision

This permit may be reopened and modified (following proper administrative procedures) to include a new compliance date, additional or modified numerical limitations, a new or different compliance schedule, a change in the whole effluent protocol or any other conditions related to the control of toxicants if one or more of the following events occur:

a. Toxicity was detected late in the life of the permit near or past the deadline for compliance;

b. The TRE results indicate that compliance with the toxic limits will require an implementation schedule past the date for compliance and the permit issuing authority agrees with the conclusion;

c. The TRE results indicate that the toxicant(s) represent pollutant(s) that may be controlled with specific numerical limits and the permit issuing authority agrees that numerical controls are the most appropriate course of action;

d. Following the implementation of numerical controls on toxicants, the permit issuing authority agrees that a modified whole effluent protocol is necessary to compensate for those toxicants that are controlled numerically;

e. The TRE reveals other unique conditions or characteristics which, in the opinion of the permit issuing authority, justify the incorporation of unanticipated special conditions in the permit.

6. Severability

The provisions of this permit are severable and if any provision of this permit, or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit, shall not be affected thereby.

7. Penalties for Falsification of Reports

The federal act provides that any person who knowingly makes any false statement, representation or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation or by imprisonment for not more than two years per violation or both.

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APPENDIX D:

BIOLOGICAL ASSESSMENT

BIOLOGICAL ASSESSMENT FOR THE HANNA DRAW COALBED METHANE EXPLORATION PROJECT, CARBON COUNTY, WYOMING

Prepared for

Bureau of Land Management
Rawlins Field Office
Rawlins, Wyoming

This Biological Assessment was prepared by TRC Mariah Associates Inc., an environmental consulting firm, with the guidance, participation, and independent evaluation of the Bureau of Land Management (BLM). The BLM, in accordance with Title 40 Code of Federal Regulations, Part 1506(a) and (b), is in agreement with the findings of the analysis and approves and takes responsibility for the scope and content of this document.

June 2001

TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

LIST OF TABLES

Page

1.0 INTRODUCTION

Williams Production RMT Company (Williams) of Denver, Colorado, proposes to explore and develop a coalbed methane (CBM) exploration project located in Townships 23 and 24 North, Ranges 80 and 81 West, Carbon County, Wyoming. This Biological Assessment (BA) presents recommendations/project commitments to ensure that the construction and subsequent operation of the proposed project would neither jeopardize the continued existence of threatened, endangered, proposed, and candidate (TEP&C) species, nor result in the permanent destruction or adverse modification of their critical habitats. Analysis of the effects of this proposed project on federal TEP&C species ensures compliance with the provisions of the *Endangered Species Act of 1973* (ESA), as amended (16 *United States Code* [U.S.C.] 1531, et seq.). In addition, this BA discusses the potential effects of the proposed project on federally listed TEP&C species occurring or potentially occurring on or adjacent to the Hanna Draw Exploration Project Area (HDEPA) (Figures 1.1 and 1.2).

TEP&C species are those that have been specifically designated as such by the USFWS. Endangered species are those in danger of extinction throughout all or a significant portion of their range. Threatened species are those likely to become endangered in the foreseeable future throughout all or a significant portion of their range. Proposed species (proposed for listing as threatened or endangered) are those for which the USFWS has issued proposed rules but for which a final listing decision has not been made, and candidate species are those for which the USFWS has sufficient data to list as threatened or endangered but for which proposed rules have not yet been issued.

Critical habitat for a threatened or endangered species includes: 1) the specific locations within the geographical area occupied by the species at the time it is listed (in accordance

Figure 1.1 Project Location.

Figure 1.2 Proposed Pipeline Corridor.

with the provisions of Section 4 of the ESA) on which are found physical or biological features that (a) are essential to the conservation of the species and (b) may require special management considerations or protection; and 2) specific areas outside the geographical area occupied by the species at the time it is listed, if determined by the Secretary (i.e., of the Interior, of Commerce, or of Agriculture) that such areas are essential for the conservation of the species. There is no designated critical habitat for any TEP&C species in the project area.

2.0 PROJECT DESCRIPTION

2.1 THE PROPOSED ACTION

Williams proposes an exploration CBM project located in Townships 23 and 24 North, Ranges 80 and 81 West, Carbon County, Wyoming, approximately 10 mi northeast of Hanna (Figures 1.1 and 1.2). The Proposed Action would involve the development of up to nine wells and associated facilities on federal lands and a ROW to construct and operate the interconnect pipeline on federal lands. Access is from Hanna along Carbon County Road 291 (Hanna Draw Road). The HDEPA encompasses approximately 18,151 acres (in the combined exploration drilling area and pipeline corridor), 6,735 acres (37%) of which are federal surface and mineral estate. The exploration project would consist of drilling, casing, completing, and producing up to 25 CBM wells for evaluation. Up to nine of these wells would be on federal lands administered by the BLM, whereas the 16 remaining wells would be on private lands. The 16 wells on private land have been approved and permitted by the Wyoming Oil and Gas Conservation Commission (WOGCC); nine of these wells have already been drilled. Twenty-three possible new well locations are shown on Figure 1.1, but only 16 new wells would be drilled. Seven contingency locations are identified to enable Williams flexibility on where to drill the exploratory wells. Development of the nine wells on federal lands (Proposed Action) would begin in the fourth quarter of 2001. All wells would be located to minimize potentially adverse environmental impacts. Production wells would be spaced at 80 acres or eight wells per 640-acre section.

The exploration area outlined on Figure 1.1 lies within the Hanna Draw Federal Unit, a BLM-designated leasing unit currently leased by Williams. Only the exploration area and a proposed interconnect pipeline corridor (Figure 1.2) are evaluated as “the project area” or “the HDEPA” in this BA. Where necessary, the exploration area (as depicted on Figure 1.1) is discussed separately from the interconnect pipeline (Figure 1.2).

Ancillary facilities would include access roads, gas and water gathering lines, a power source, a central gathering/metering facility (CGF), a reservoir, and, if the field proves economically viable, a compressor station and the interconnect pipeline. No power lines are currently proposed.

All produced water would be contained in the existing reservoir, and no uncontained surface water discharge is proposed at this time. Produced water quality would be monitored in accordance with state and federal regulations.

Two existing improved roads provide the primary access to the field. Field development of 16 new wells would require the construction/upgrading of a maximum of 6.5 mi of access roads with adjacent gas and produced water gathering lines (facilities corridors). Approximately 1.5 mi (not included in the 6.5 mi of access roads constructed or reconstructed) of existing undeveloped road have been upgraded. An estimated 3.75 mi of new road/ facilities corridors would be built on private lands and 2.75 mi of new road/facilities corridors would be built on federal land.

Each well would require gas and water gathering lines (gas lines to collect CBM from wells and transport it to a centralized pod to be located on private land and water lines to transport produced water to a reservoir for containment) and a power source. Natural gas gathering lines (made of up to 3-inch diameter high density polyethelene [HDPE]) from exploration wells would be tied into the pod for gas metering and subsequent venting. A network of waterlines exists on private lands in the project area. Short new lines (up to 6-inch diameter HDPE) would be required to collect produced water on the two federal sections; these would connect to the existing network. Water lines would converge in the water-containment reservoir (Figure 1.1) that is already permitted and constructed. Gas and water lines would be installed adjacent to and overlapping with the access roads ROWs. Power would be supplied by gas-driven engines, propane generators, or gas-powered generators fueled by produced gas.

Disturbance on federal lands would be approximately 162.7 acres initially and 39.7 acres after preliminary reclamation (Table 2.1).

It is anticipated that it would take approximately 8 days to drill, log, and case each well utilizing a conventional rotary drilling rig and associated rig equipment. Two additional days would be required to run a bond log, perforate, and set a pump with a completion rig. Road construction would occur concurrently with well drilling and testing, and, although some level of activity would be continual, peak drilling and construction would be scheduled for the fourth quarter of 2001.

The anticipated life-of-project (LOP) would be from 5 to 30 years, depending upon the success of the exploration project. Additional *National Environmental Policy Act* (NEPA) analyses would be conducted if additional facilities are required for project development.

Project documents and other information are located at the U.S. Bureau of Land Management (BLM) Rawlins Field Office in Rawlins, Wyoming.

2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, nine wells would not be developed on federal land. Project development within the HDEPA considered as components of the No Action Alternative are limited to the disturbances associated with the Road ROW granted by BLM to Williams in September 2001 to provide access to provide access to private land for the purposes of developing private leases. The interconnect pipeline would not be constructed at this time, although, if the field is productive, it would probably be constructed at a later date pending successful completion of the environmental review process.

The analysis of a No Action Alternative provides a benchmark, enabling decision-makers to compare the magnitude of environmental effects of the action alternative. Under the No Action

Table 2.1 Types and Approximate Acreage of Disturbance on Federal Land of Proposed Action and No Action Surface Alternatives.

	Proposed Action					
	Initial Disturbance Area (acres)			Life-of-Project (LOP) Disturbance Area (acres)		
	Existing	Proposed	Total	Existing	Proposed	Total
Well pads[1]	0.0	10.8	10.8	0.0	2.7	2.7
Facilities corridors[2]	23.7	26.7	50.4	23.7	13.3	37.0
Interconnect pipeline[3,4]	0.0	101.5	101.5	0.0	0.0	0.0
Total	23.7	139.0	162.7	23.7	16.0	39.7

	No Action Alternative					
	Initial Disturbance Area (acres)			Life-of-Project (LOP) Disturbance Area (acres)		
	Existing	Proposed	Total	Existing	Proposed	Total
Well pads	0.0	0.0	0.0	0.0	0.0	0.0
Facilities corridors	23.7	0.0	23.7	23.7	0.0	23.7
Interconnect pipeline	0.0	0.0	0.0	0.0	0.0	0.0
Total	23.7	0.0	23.7	23.7	0.0	23.7

[1] Assumes initial disturbance of 1.2 acres for each well pad and LOP disturbance of 0.3 acre per well pad.

[2] Assumes 2.75 mi of new road with parallel gas gathering and water discharge lines (80-ft average disturbance width). All disturbance except for the estimated 40-ft wide road travelway and adjacent ditches would be reclaimed for the LOP.

[3] Assumes and average disturbance width of 90 ft along the entrie 19.5 mi long corridor. An estimated 9.3 mi would cross federal land.

[4] The compressor station (about 4.0 acres of disturbance) would be located on private land.

Alternative, the BLM would deny development of the CBM project on federal lands as currently proposed by Williams, while allowing existing land uses to continue.

A No Action decision would only be considered under the following circumstances:

1. if there were no acceptable means of mitigating significant adverse impacts to stipulated surface resource values, this may trigger denial of Application for Permit to Drill (APD) and right-of-way (ROW) applications and require consideration and analysis of other alternative(s); or,
2. if the USFWS concluded that the Proposed Action would likely jeopardize the continued existence of TEP&C species, the APD and/or ROW application may be denied in whole or in part.

This BA will help to determine whether the proposed project meets either one of these conditions.

3.0 METHODS

A list of TEP&C species that potentially occur in the vicinity of the proposed project was obtained from the Wyoming Supervisor's Office of the U.S. Fish and Wildlife Service (USFWS) (2001). All TEP&C species identified from these sources are discussed in Chapter 4.0 of this BA.

Information pertaining to the natural history and distribution of the TEP&C species potentially occurring in the area was gathered from the above sources, published literature, and on-site surveys. The purpose of this BA is to provide a project-wide assessment of potential impacts to the TEP&C species potentially occurring in the area and to identify appropriate mitigations prior to project implementation. Mitigation measures identified in this BA would be applied to site-specific developments.

4.0 PROJECT-WIDE MITIGATION MEASURES FOR TEP&C SPECIES

Endangered species identified by the USFWS as potentially occurring in the HDEPA vicinity include black-footed ferret and blowout (Hayden's) penstemon (Table 4.1). Endangered fish species in the Colorado River [sic, see footnote 2 below] and endangered Platte River species were also identified as potentially affected by the project. Bald eagle and Canada lynx, both threatened species, are also discussed. Mountain plover, a species proposed for listing as threatened, may also occur in the vicinity of the project.

This section describes measures that would be utilized to avoid, minimize, or mitigate potential impacts to TEP&C species due to project development. Additional environmental protection measures designed specifically for other resources present on the area (e.g., soils, vegetation,

Table 4.1 USFWS List of TEP&C Species Potentially Affected by the Project.

Common Name	Scientific Name	Status[1]	Habitat/Location
Black-footed ferret	*Mustela nigripes*	E	Prairie dog colonies
Blowout penstemon	*Penstemon haydenii*	E	Sand dunes north of Ferris Mountains
Colorado River fish species	Various [2]	E	Downstream riverine habitat of the Yampa, Green, and Colorado River systems
Platte River species	Various [3]	E	Downstream riverine habitat of the Platte River in Nebraska
Bald eagle	*Haliaeetus leucocephalus*	T	Found throughout state
Canada lynx	*Lynx canadensis*	T	Montane forests
Mountain plover	*Charadrius montanus*	P	Grasslands

[1] T = threatened, E = endangered, P = proposed for listing as threatened or endangered.

[2] Bonytail chub (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Hila cypha*), and razorback sucker (*Xyrauchen texanus*). These species were accidentally listed as potentially affected in the USFWS letter, but the project is not within the Colorado River drainage and so they would not be affected.

[3] Whooping crane (*Grus americana*), interior least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), pallid sturgeon (*Scaphirhynchus albus*), bald eagle (*Haliaeetus leucocephalus*), Eskimo curlew (*Numenius borealis*), and prairie fringed orchid (*Platanthera praeclara*).

wetlands, visual resources) are provided in the EA for this project. Exceptions to project-wide mitigation measures may be made on a case-by-case basis by the BLM if a thorough analysis determines that the TEP&C species for which the measure was developed would not be impacted. To ensure compliance with mitigation measures presented in this BA and in APD and ROW applications, Williams, or its designated contractor, would have qualified individuals available during construction operations to consult with the BLM on a case-by-case basis as necessary during project development.

All of the proposed project-wide mitigation/environmental protection measures identified in this chapter would be implemented on all project-affected lands (public and private). Development activities would be conducted in accordance with all appropriate federal, state, and county laws, rules, and regulations. Project-wide mitigation measures for TEP&C species are presented below.

Mitigation measures would include, but are not limited to, the following.

<u>All Species</u>:

1. To ensure construction activities occur commensurate with identified mitigations, a qualified biologist would be on site during construction as deemed appropriate by the BLM and as identified during APD and ROW application processing.

2. Well pads, roads, gas and water gathering lines, the interconnect pipeline, and ancillary facilities would be located and designed to minimize disturbances to areas of high wildlife habitat value (e.g., prairie dog colonies, suitable mountain plover habitat, greater sage-grouse leks, cushion plant communities [i.e., potential mountain plover nesting habitat], playa lakes, wetlands, and riparian areas).

3. Areas with high erosion potential and/or rugged topography (steep slopes, windblown deposits, floodplains, unstable soil) would be avoided, where practical.

4. Removal or disturbance of vegetation would be minimized through construction site management (e.g., by utilizing previously disturbed areas, using existing ROWs, designating limited equipment/materials storage yards and staging areas, scalping), and Williams would develop and implement detailed reclamation specifications including stabilizing and revegetating disturbed areas to minimize impacts from project-related activities.

5. To minimize wildlife mortality due to vehicle collisions, Williams would advise project personnel regarding appropriate speed limits on designated access roads as identified by BLM. Potential increases in poaching would be minimized through employee and contractor education regarding wildlife laws. If violations are discovered, the offending employee or contractor would be disciplined and may be dismissed by Williams and/or prosecuted by the Wyoming Game and Fish Department (WGFD) and/or USFWS.

6. Areas potentially hazardous to TEP&C species (e.g., reserve pits, evaporation pits, hazardous material storage areas) would be adequately protected (e.g., fenced, netted) to prevent access by wildlife and ensure protection of migratory birds and other wildlife as deemed necessary by the BLM.

7. Firearms and dogs would not be allowed on-site by project employees. Williams would enforce existing drug, alcohol, and firearms policies.

8. To protect plant populations and wildlife habitat, project-related travel would be restricted to designated access roads--no off-road travel would be allowed except in emergencies.

9. Wildlife-proof fencing would be utilized on reclaimed areas if it is determined that wildlife species and/or livestock are impeding successful vegetation establishment.

10. Williams would finance site-specific surveys for blowout (Hayden's) penstemon and its habitat prior to any surface disturbance in areas determined by BLM to contain potential habitat. These surveys would be completed by a qualified botanist as authorized by the BLM, and this botanist would be subject to BLM's special status plant survey policy requirements. Data from these surveys would be provided to the BLM, and if blowout penstemon is found it would be avoided or its habitat is found BLM/USFWS recommendations for avoidance or mitigation would be implemented. Project facilities would be relocated, where practical, to avoid its habitat.

No species-specific mitigations are recommended for Platte River species, bald eagle, or Canada lynx because additional mitigation above and beyond that described for all species is not needed to avoid adversely affecting these species (Section 5.0 in this BA). Species-specific mitigations for black-footed ferret and mountain plover are described below.

Black-footed Ferret:

1. Williams and its contractors would be shown how to identify black-footed ferret and their sign and provided information about its habitat requirements, natural history, status, threats, possible impacts of gas development activities, and ways to minimize these impacts.

2. All active white-tailed prairie dog towns/complexes would be mapped within the HDEPA on federal lands every 3-5 years beginning in 2002. Burrow density determinations would not be necessary because any colonies within the HDEPA are part of the larger complex supporting the reintroduced black-footed ferret population.

3. Attempts would be made to locate all project components at least 50 m (164 ft) from these towns/complexes to avoid direct impacts to the towns.

4. If suitable prairie dog town/complex avoidance is not possible, the USFWS is recommending surveys of towns/complexes for ferrets (personal communication, March 2001, with Pat Diebert, USFWS), which should be conducted on all federal lands in accordance with USFWS guidelines and requirements (USFWS 1989). This information would be provided to the BLM and USFWS.

5. If any black-footed ferrets or their sign are found within a prairie dog town or complex previously determined to be unsuitable for, or free of, ferrets, the USFWS would be contacted immediately, all previously authorized projected-related activities ongoing in such towns or complexes would be suspended immediately, and Section 7(a)(4) conferencing with the USFWS and BLM would be initiated.

6. Williams and its contractors would prohibit dogs from the HDEPA by project employees.

7. Observations of black-footed ferrets, their sign, or carcasses would be reported within 24 hours to the BLM, Rawlins Field Office, and the USFWS.

8. All suspected observations of black-footed ferrets, their sign, or carcasses on the HDEPA and the location of the suspected observation however obtained, would be reported within 24 hours to:

   Wildlife Biologist, BLM
   Larry Apple, (307) 328-4204
   Rawlins Field Office
   P.O. Box 2407
   1300 North Third Street
   Rawlins, WY 82301

   Field Supervisor or Designee, USFWS
   (307) 772-2374
   Wyoming Field Office
   4000 Airport Parkway
   Cheyenne, WY 82001

   Observations would include a description including what was seen, time, date, exact location, and observer's name, address, and telephone number. Carcasses or other suspected ferret remains would be collected by the BLM or USFWS employees and deposited with the USFWS, Wyoming Field office.

Mountain Plover:

1. Williams and its contractors would be shown how to identify mountain plover and provided information about its habitat requirements, natural history, status, threats, and possible impacts of gas development activities. Incidental observations of mountain plovers would be solicited from all field personnel.

2. For construction during the period between May 1 and June 15, 2002, unless otherwise approved by the USFWS, mountain plover surveys would be conducted on all lands by a Williams-financed, BLM-approved biologist in accordance with existing or revised USFWS guidelines (USFWS 2001). These surveys have been completed in the

exploration area in May and June 2001, and no mountain plover were observed (Section 5.6). Surveys would be completed prior to construction each year construction is to occur between April 10 and July 10.

3. If an active nest and/or mountain plover are found within 0.25 mi of proposed features, informal conferencing would occur with the USFWS.

4. If an active nest is found in the survey area, planned activities would be delayed 37 days, or 1 week post-hatching, or if a brood of flightless chicks is observed, activities would be delayed at least 7 days.

5. Where access roads and/or well locations have been constructed prior to the mountain plover nesting season (April 10 - July 10) and use of these areas has not been initiated for development actions prior to April 10, a BLM-approved biologist would conduct surveys of these disturbed areas prior to use to determine whether mountain plover are present. In the event plover nesting is occurring, Operators would delay development activities until nesting is complete.

6. If nesting habitat is disturbed, these disturbed areas would be reclaimed to approximate original conditions (topography, vegetation, hydrology, etc.) after completion of activities in the area, in part to ensure suitable mountain plover breeding habitats are present on the reclaimed landscape. Seed mixes and application rates for reclamation would produce stands of vegetation suitable for plover nesting in suitable plover habitat while meeting the BLM's requirements for stabilizing soil and controlling weeds. Seed mixes and application rates for reclamation would be designed to produce stands of sparse low-growing vegetation suitable for plover nesting in previously suitable mountain plover habitat. Reclamation would attempt to return the plant community to the pre-existing condition as soon as possible.

7. To minimize destruction of nests and disturbance to breeding plovers from construction and reclamation activities, grading, seeding, or other ground-disturbing activities would not occur from April 10 to July 10 unless surveys within 0.25 mi of project facilities consistent with USFWS-approved methods find that no plovers are nesting in the area.

8. All suspected observations of mountain plover adults, eggs, chicks, or carcasses on the HDEPA, however obtained, would be reported within 24 hours to:

   Wildlife Biologist, BLM
   Larry Apple, (307) 328-4204
   Rawlins Field Office
   P.O. Box 2407
   1300 North Third Street
   Rawlins, WY 82301

   Field Supervisor or Designee, USFWS
   (307) 772-2374
   Wyoming Field Office
   4000 Airport Parkway
   Cheyenne, WY 82001

   Observations would include a description including what was seen, time, date, exact location, and observer's name, address, and telephone number. Carcasses or other suspected plover remains would be collected by the BLM or USFWS employees and deposited with the USFWS, Wyoming Field office.

5.0 SPECIES ACCOUNTS

This chapter presents a discussion of the status, habitat, potential effects, and mitigation for USFWS TEP&C animal and plant species that may occur in the HDEPA and adjacent areas (Table 4.1).

5.1 BLACK-FOOTED FERRET

5.1.1 Current Status and Habitat Use

The black-footed ferret, a federally listed endangered species, is a mink-sized mammal, distinguished by black feet, a black raccoon-like face mask, and a black tip on an otherwise whitish tail. Within the HDEPA, the experimental nonessential population is managed as a species proposed for listing.

The black-footed ferret was once distributed throughout the high plains of the Rocky Mountain and western Great Plains regions (Forrest et al. 1985). Prairie dogs are the main food of black-footed ferrets (Sheets et al. 1972), and, historically, few black-footed ferrets have been collected away from prairie dog towns (Forrest et al. 1985). Black-footed ferrets were considered extinct until a small population was discovered near Meeteetse, Wyoming, in 1981. Following outbreaks of distemper, surviving black-footed ferrets were brought into captivity and a captive breeding program was initiated (USFWS 1988). Black-footed ferrets were reintroduced in the Shirley Basin of central Wyoming between 1991 and 1994. The HDEPA is within an area designated as "ferret-free" (WGFD and BLM 1991) prior to the reintroduction into Shirley Basin; thus, any ferrets that occur within the HDEPA would be considered part of an experimental/nonessential population.

Historically, this part of the Hanna Basin provided ferret habitat--confirmed ferret observations were recorded in 1968 and 1979, and in 1991 two observations of experimental population

ferrets were recorded 13 mi north and 20 mi northeast of the Hanna Draw Federal Unit (BLM 1993). The Hanna Draw Federal Unit, the northern portion of pipeline corridor, and surrounding areas are located within the Shirley Basin/Medicine Bow Black-footed Ferret Management Area, which itself is divided into Primary Management Zones (PMZs) 1 and 2 and areas outside the PMZs. PMZs are areas designated by WGFD and USFWS to assist in the management of the black-footed ferret reintroduction effort (WGFD and BLM 1991).

In May 2001, prairie dog colonies on all federal lands and on private lands accessible via public access within the Hanna Draw Federal Unit and the proposed pipeline corridor were mapped in the field using an ocular estimate of colony boundaries and a global positioning system. An estimated 111 acres of white-tailed prairie dog colonies occur within and adjacent to the HDEPA (Figure 5.1). As in the early 1990s (BLM 1993), a majority of the colonies are located within PMZ 2, just outside of the proposed exploration area and along the pipeline corridor. The two small (<10 acres each) colonies within the exploration area are outside the PMZs but within the Shirley Basin/Medicine Bow Black-Footed Ferret Management Area.

The four small prairie dog colonies within the proposed drilling area would be avoided, if possible, during exploration drilling, so no further work to identify potential black-footed ferret habitat or to search for black-footed ferrets would be necessary in the exploration area. If either colony would be disturbed, colony mapping would be completed and black-footed ferret searches would be conducted on federal land in accordance with USFWS guidelines (USFWS 1989). If any ferrets or ferret sign are observed, further development would be prohibited until conferencing with the USFWS has been completed.

Short segments of the pipeline corridor cross prairie dog colonies, and others may be present on lands not mapped in 2001. As with the proposed drilling area, if any colonies would be disturbed, black-footed ferret habitat mapping and ferret searches would be completed, if required, prior to disturbance.

Figure 5.1 White-tailed Prairie Dog Colonies.

5.1.2 Potential Effects

It is anticipated that the project would not adversely affect this species because no black-footed ferrets are known to occur in the HDEPA, it is unlikely that ferrets occur in the HDEPA, and mitigation measures (Section 4.0) for potential impacts to black-footed ferrets would be applied.

The proposed project may contribute some additional impacts to the cumulative effects on black-footed ferret habitat from ranching, oil and gas projects, coal mining, and transportation or on prairie dogs (i.e., black-footed ferret prey base) from pest control and recreational shooting through habitat loss and increased access.

In 1991, the USFWS anticipated a worst-case oil and gas development scenario of 20,664 acres of disturbance. As of December 2000, a total of 173 wells had been drilled within the management area, 149 of which have been permanently abandoned (BLM 1999). Ten producing wells occurred in the management area in 2000. Assuming an estimated 9 acres of disturbance per well (BLM 1999), a total of 1,557 acres have been disturbed, 1,341 of which have been reclaimed (i.e., the 149 abandoned wells), and 90 acres remain disturbed. The proposed development would not cause disturbance due to oil and gas development within the management area to exceed the expected levels.

5.1.3 Mitigation Measures

No additional mitigation is recommended.

5.2 BLOWOUT (HAYDEN'S) PENSTEMON

5.2.1 Current Status and Habitat

Blowout penstemon, a federally listed endangered species, is a perennial herb usually less than 30 cm tall, with greenish blue, waxy, linear leaves. The inflorescence is 6 to 16 cm long with 6 to 10 compact leafy whorls of milky-blue to pale lavender flowers.

Habitat for blowout penstemon is sparsely vegetated, actively shifting sand dunes and blowout depressions. Blowouts are craters that have been excavated out of the sands by the swirling action of prevailing westerly and northwesterly winds. These habitats are subject to environmental extremes in wind, temperature, and soil moisture. Blowout penstemon is a primary invader of blowouts and does not persist when a blowout becomes completely vegetated. The plant is known from three occurrences in Wyoming. The plant is a regional endemic restricted to the Sand Hills of western Nebraska and south-central Wyoming in the Ferris/Seminoe Mountains region near Bear Mountain. One population is estimated at 300-500 plants, whereas the other two populations contain approximately 1,000 plants each.

Neither blowout penstemon nor actively sifting sand dunes or blowouts are known to occur on federal land within or immediately adjacent to the HDEPA (Wyoming Natural Diversity Database [WNDD] 2001; TRC Mariah Associates Inc. [TRC Mariah] 2001; personal communication, June 2001, with Jim Case, Wyoming Geological Survey).

5.2.2 Potential Effects

Blowout penstemon is not known or likely to be present on federal lands within the HDEPA due to the absence of suitable habitat (sand dunes). Therefore, the Proposed Action (nine wells on federal land) is unlikely to adversely affect the species, nor is it likely to contribute to regional cumulative effects to the species. Private lands would be surveyed for habitat/individuals prior to disturbance and any that are observed would be avoided until consultation with the USFWS has been completed. Therefore, no effects to this species are anticipated.

5.2.3 Mitigation Measures

No additional mitigation is recommended.

5.3 PLATTE RIVER SPECIES

Since 1978, the USFWS has consistently taken the position in its Section 7 consultations that federal agency actions resulting in water depletions to the Platte River system may affect the endangered whooping crane, interior least tern, pallid sturgeon, and eskimo curlew, as well as the threatened piping plover, bald eagle, and western prairie fringed orchid.

In general, depletions include evaporative losses and/or consumptive use, often characterized as diversions from the Platte River or its tributaries less return flows. Project elements that could be associated with depletions to the Platte River system include, but are not limited to, ponds (detention/ recreation/irrigation storage/stock watering), lakes (recreation, irrigation, storage/municipal, storage/ power generation), reservoirs (recreation, irrigation storage/ municipal, storage/power generation), created or enhanced wetlands, pipelines, wells, diversion structures, and water treatment facilities.

Any actions that may result in a water depletion to the Platte River system must: 1) be identified, 2) provide an estimate of the amount and time (by month) of average annual water depletion (both existing and new depletions), and 3) describe methods of arriving at such estimates (USFWS 2000).

North Platte River depletions are not anticipated as a result of the proposed project due to the depth of ground water-producing formations (approximately 5,000 ft) and the age of the ground water produced (approximately 5,000 years before present). All produced water would be discharged into the water containment reservoir where it would evaporate, so no net gain or loss

of water in the surface water system would occur. Thus, the proposed project is unlikely to adversely affect downstream Platte River species.

Grab samples of Hanna Draw Well No. 19 (a producing well) and Seminoe Reservoir were analyzed for deuterium and O^{16}/O^{18} to assess the probable age of produced water. Both samples show that the waters are of meteoric origin; however, they have very different stable isotopic compositions and are not directly related to one another (personal communication, June 2001, with Joe Frank, HydroGeo, Inc.). The Well No. 19 sample had a very negative isotopic composition that is commonly seen in ground water that has been recharged at high elevations or during the last major cold climatic regime, typically an ice age. Ground water in Well No. 19 could not have recharged from a high elevation, given its geographic location; therefore, the well water must have been recharged to the aquifer during the last ice age in this region (about 5,000 years ago), at the earliest.

5.4 BALD EAGLE

5.4.1 Current Status and Habitat Use

The bald eagle is a federally threatened species (downlisted from endangered and now proposed for removal from federal listing). This species requires cliffs, large trees, or sheltered canyons associated with concentrated food sources (e.g., fisheries or waterfowl concentration areas) for nesting and/or roosting areas (Edwards 1969; Snow 1973; Call 1978; Steenhof 1978; Peterson 1986). Bald eagles forage over wide areas during the non-nesting season (fall and winter) and scavenge on animal carcasses such as pronghorn, deer, and elk. Potential roosting sites and wintering areas are generally associated with rivers or lakes.

While bald eagle observations have been made adjacent to the HDEPA (Western EcoSystems Technology, Inc. 2000), no known bald eagle nests or winter roosts occur within or immediately adjacent to the HDEPA (WNDD 2001).

5.4.2 Potential Effects

Migrating bald eagles and those wintering at locations sufficiently close to the proposed project area may occasionally fly over the HDEPA while foraging; however, since no known nests or roosts occur near the project area nor are nests or roosts likely to be established due to a lack of trees and cliffs, the proposed project is unlikely to adversely affect bald eagles.

Cumulative impacts resulting from the proposed project likely would contribute only negligible additional effects, if any, to bald eagle habitat. Some foraging habitat would be disturbed, but large areas remain available to eagles. Also, all developments (including the proposed project) would avoid winter roosts and active nests, if present, further minimizing potential disturbance to the species.

5.4.3 Mitigation Measures

No additional mitigation is recommended.

5.5 CANADA LYNX

The threatened Canada lynx inhabits montane forests and is unlikely to occur in the project area. This species would not be affected by the proposed project.

5.6 MOUNTAIN PLOVER

5.6.1 Current Status and Habitat Use

The mountain plover is a medium-sized shorebird resembling the killdeer but with longer legs, more erect posture, and drabber coloration. It is uniformly sandy brown above and on its sides. Its throat, breast, and underwings are white. Breeding birds have a black loral stripe extending

from bill to eye and a partially to solid black forehead (Knopf 1996). The mountain plover has been proposed for federal listing as a threatened species by the USFWS.

Mountain plovers nest on high plains, shortgrass prairie, shrub-steppe, and desert tablelands--commonly on or near prairie dog colonies or pastures heavily grazed by livestock. Nest sites are characterized by four factors: 1) dry soil, with no open water in the immediate vicinity; 2) very short vegetation; 3) a high proportion (typically >30%) of bare ground; and 4) flat or very gentle slopes (i.e., <5-12%) (Graul 1975; Graul and Webster 1976; Knowles et al. 1982; Olson 1984; Olson and Edge 1985; Knopf 1996). Mountain plovers breed in flat sites dominated by low and sparse grass in southeastern Wyoming. Parrish et al. (1992) documented preference for vegetation <10 cm tall and slopes of <3% in the Powder River Basin. In western Wyoming, breeding birds prefer sites dominated by bare ground and cushion plants with slopes of <5%.

Mountain plover are often found within or near prairie dog colonies in Wyoming. Their association with prairie dogs is likely due to a preference for similar habitats (both species prefer dry flat sites). Plovers also are likely attracted to the low vegetation and abundant bare ground created by prairie dog activities (Knowles et al. 1982; Olson and Edge 1985). Mountain plovers are opportunistic foragers that feed primarily on insects (Knopf 1994, 1996).

Nesting begins in April in Colorado (Knopf 1996) and eastern Wyoming. Breeding may begin 2-4 weeks later at the higher elevations of western Wyoming (WNDD 2000). Clutch completion occurs mid-May to late June. Both sexes incubate 2-4 eggs for 29 days at two separate nests; the female may lay a second clutch while the male incubates the first clutch (Graul 1975). Nests of different pairs tend to be clustered within large patches of apparently suitable habitat. It is not known whether breeding pairs are responding to more suitable habitat features or if this behavior is a social facilitation of breeding (Graul 1975; Knopf 1996). Breeding bird surveys between 1966 and 1987 show an overall decline in the continental population of mountain plovers (U.S. Forest Service [USFS] 1994a). Surveys completed in 1991 indicated that only 4,360 to 5,610 mountain plovers remained on the North American continent (USFS 1994b). Probably the most important factors influencing the decline of the species are human impacts, habitat alteration on breeding grounds, and degradation of wintering habitats (e.g., southern

Texas, California) (Knopf 1994, 1996). Loss of breeding habitat due to cultivation and prey base declines resulting from pesticide use are also threats to mountain plover survival (Wiens and Dyer 1975). Cattle often maintain the open grass habitat favored by mountain plovers, so livestock grazing may benefit the species (Klipple and Costello 1960).

In Wyoming, mountain plovers occur statewide from March to August in flat dry sites with open vegetation (e.g., grassland, sage-steppe, desert shrub) (Dorn and Dorn 1990; Oakleaf et al. 1992). The grasslands of eastern Wyoming may represent some of the best remaining breeding habitat in the region. Breeding birds are regularly encountered in the shrub-steppe basins of western Wyoming, northwestern Colorado, and northeastern Utah (WNDD 2000). This portion of mountain plover breeding range is relatively unstudied, and it is unknown what proportion of the current breeding population resides in Wyoming. Because low and sparse vegetation (preferred for nesting) is maintained largely by abiotic factors such as landform, soil, and precipitation in western Wyoming and because, in Wyoming, vegetation communities have been minimally altered by humans, range and abundance of this species in Wyoming may approximate historic levels (WNDD 2000).

The HDEPA is vegetated primarily by Wyoming big sagebrush steppe intermixed with grasslands (Section 3.1.1 in the EA). Very little of the area is suitable mountain plover breeding habitat, which is characterized by:

- generally flat and level or gently sloping terrain;
- sparse ground vegetation with at least 30% bare ground (ocular estimate);
- grasses, shrubs, and forbs (less than 4 inches tall), in spaced clumps or mats (i.e., cushion plant communities); and
- widely spaced and generally low-growing shrubs (4 to 16 inches tall).

Opuntia and/or low *Atriplex*, non-leaky stocktanks, heavily grazed or burned areas, and active prairie dog colonies are considered secondary indicators of mountain plover habitat. It is unusual to find mountain plovers on sites characterized by rough, irregular, or rolling terrain, dense vegetation, grass taller than 4 inches, or wet soil; therefore, they were not considered mountain plover habitat (Figure 5.2). Mountain plover have not been documented in the HDEPA (BLM 1993; WNDD 2001). No mountain plover have been observed in the Simpson

Figure 5.2 Potential Mountain Plover Habitat.

Ridge area, which was monitored for several years as part of a proposed wind power project (Western EcoSystems Technology, Inc. 2000).

Mountain plover surveys were conducted in suitable habitat in the proposed exploration area only during the weeks of May 4, May 28, and June 11, 2001, in accordance with USFWS guidelines (USFWS 2001). No mountain plover sightings were reported within the proposed drilling area. No mountain plover surveys were completed within the pipeline corridor in 2001. All potential habitat on federal land within the HDEPA slated for 2001 construction has been surveyed in 2001. All potential habitat slated for disturbance in future years would be surveyed prior to disturbance unless otherwise directed by the BLM.

5.6.2 Potential Effects

Since the exact locations of well pads, associated facilities, and the interconnect pipeline are not yet known, it is not possible to assess the amount of potential mountain plover habitat that would be lost, although it would likely be minimal given the small amount of potential habitat in the HDEPA. The loss of mountain plover breeding and foraging habitat due to proposed project activities may adversely affect individuals, if they utilize these potential habitats, through habitat loss and displacement from directly affected and adjacent areas; however, the proposed project is unlikely to result in a take of individuals in 2001 since project construction would occur between July 11 and April 9 outside the breeding and nesting period. With the implementation of project-wide mitigation measures (Section 4.0), no adverse effects are anticipated in future years. Given the apparent lack of mountain plover use within the proposed drilling area and the HDEPA as a whole, the limited and scattered nature of ground disturbance, and the reclamation of habitats to conditions suitable for plover breeding and nesting, the proposed project is unlikely to cause the long-term displacement of plovers from disturbed breeding and nesting areas. (If the mountain plover is listed, critical habitat will be designated by the USFWS which may affect reclamation requirements in suitable habitat.)

Cumulative impacts to the local mountain plover population as a result of the proposed project are unknown. Although disturbance due to ranching, oil and gas development, coal mining, and transportation has removed an unknown portion of potential mountain plover breeding and nesting habitat, the lack of or very limited utilization of potential habitat and the relatively small disturbance acreage and short-term nature of the disturbance make it unlikely that the proposed project, in combination with these actions, would jeopardize plover reproduction.

5.6.3 Mitigation Measures

Year 2001 drilling and related facilities construction would occur between July 11 and April 9 (i.e., outside the mountain plover breeding and nesting season). Williams surveys for mountain plover on the HDEPA, if required by the BLM and USFWS and unless otherwise directed by the USFWS, would occur prior to any disturbance scheduled to occur during the breeding and nesting season. Plover surveys would be completed along the pipeline route (once it is finalized) using the USFWS protocol for linear disturbances (USFWS 2001) prior to construction. Williams would reclaim mountain plover habitat by using seed mixtures that contain low-growing native species. If reclamation activities are planned between April 10 and July 10, surveys for mountain plovers would be implemented pursuant to USFWS protocol prior to disturbance.

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APPENDIX E:

LIST OF HAZARDOUS AND EXTREMELY HAZARDOUS MATERIALS

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LIST OF HAZARDOUS AND EXTREMELY HAZARDOUS MATERIALS

Table E.1 Hazardous and Extremely Hazardous Materials Potentially Utilized or Produced During Construction, Drilling, Production, and Reclamation Operations.

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
Drilling Material			
Barite	--	Barium compounds	
	--	Fine mineral fibers	
Bentonite	15,000 lbs	Fine mineral fibers	
Caustic Soda	300 lbs	Sodium hydroxide	
Glutaraidehyde	--	Isopropyl alcohol	
Lime	500 lbs	Calcium hydroxide	
Mica	500 lbs	Fine mineral fibers	
Modified Tannin	--	Ferrous sulfate	
	--	Fine mineral fibers	
Phoephaza Esters	--	Mehanol	
Polyacrylamides	100 gal		Acrylamide
	--	PAHs	
	--	Petroleum distillates	
	--	POM	
Retarders	--	Fine mineral fibers	
Anionic Polyacrylamide	20 lbs		Acrylamide
Polyanionic Cellulose	600 lbs	Fine mineral fibers	
Cementing/Plugging			
Bentonite	3,115 lbs	Fine mineral fibers	
Anti-foamer	--	Glycol ethers	
Calcium Chloride Flake	1,797 lbs	Fine mineral fibers	
Cellophane Flake	231 lbs	Fine mineral fibers	
Cements	66,928 lbs	Aluminum oxide	
	--	Fine mineral fibers	
Chemical Wash	840 gal	Ammonium oxide	
	--	Glycol ethers	
Diamaceous Earth	--	Fine mineral fibers	
Extenders	22,866 lbs	Aluminum oxide	
	--	Fine mineral fibers	
Fluid Loss Additive	--	Acrylamide	
	--	Fine mineral fibers	
	--	Napthalene	
Friction Reducer	--	Fine mineral fibers	
	--	Napthalene	
	--	PAHs	
	--	POM	

Table E.1 (Continued)

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
Mud Flash	--	Fine mineral fibers	
Retarder	--	Fine mineral fibers	
Salt	--	Fine mineral fibers	
Silica Flour	--	Fine mineral fibers	
Fracturing Materials			
Biocides	4 gal	Fine mineral fibers	
	--	PAHs	
	--	POM	
Breakers	40 lbs	Ammonium persulphate	
	--	Ammonium sulphate	
	--	Copper compounds	
	--	Ethylene glycol	
	--	Fine mineral fibers	
	--	Glycol ethers	
Clay Stabilizer	--	Fine mineral fibers	
	--	Glycol ethers	
	--	Isopropyl alcohol	
	--	Methanol	
	--	PAHs	
	--	POM	
Crosslinkers	22 gal	Ammonium chloride	
	--	Methanol	
	--	Potassium hydroxide	
	--	Zirconium nitrate	
	--	Zirconium sulfate	
Foaming Agent	190 gal	Glycol ethers	
Gelling Agent	126 gal	Benzene	
	--	Ethylbenzene	
	--	Methyl tert-butyl ether	
	--	Napthalene	
	--	PAHs	
	--	POM	
	--	Sodium hydroxide	
	--	m-Xylene	
	--	o-Xylene	
	--	p-Xylene	
pH Buffers	--	Acetic acid	
	--	Benzoic acid	

Table E.1 (Continued)

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
	--	Fumeric acid	
	1,250 gal	Hydrochloric acid	
	27 gal	Sodium hydroxide	
Sands	170,300 lbs	Fine mineral fibers	
Solvents	--	Glycol ethers	
Surfactants	--	Glycol ethers	
	--	Isopropyl alcohol	
	--	Methanol	
	--	PAHs	
	--	POM	
Corrosion Inhibitor	10 gal		
Production Products			
Natural gas	--	n-Hexane PAHs POM	
Produced water/drill cuttings	--	See Appendix A, Water Management Plan	
Fuels			
Diesel fuel	--	Benzene	
	--	Cumene	
	--	Ethylbenzene	
	--	Methyl tert-butyl ether	
	--	Naphthalene	
	--	PAHs	
	--	POM	
	--	Toluene	
	--	m-Xylene	
	--	o-Xylene	
	--	p-Xylene	
Gasoline	--	Benzene	
	--	Cumene	
	--	Cyclohexane	
	--	Ethylbenzene	
	--	n-Hexane	
	--	Methyl tert-butyl ether	
	--	Naphthalene	
	--	PAHs	
	--	POM	
	--		Tetraethyl lead

Table E.1 (Continued)

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
	--	Toluene	
	--	m-Xylene	
	--	o-Xylene	
	--	p-Xylene	
Natural gas	--	n-Hexane	
	--	PAHs	
	--	POM	
Propane	--	Propylene	
Pipeline Materials			
Coating	--	Aluminum oxide	
Cupric sulfate solution	--	Cupric sulfate	
	--	Sulfuric acid	
Diethanolamine	--	Diethanolamine	
LP Gas	--	Benzene	
	--	n-Hexane	
	--	Propylene	
Molecular sieves	--	Aluminum oxide	
Pipeline primer	--	Naphthalene	
	--	Toluene	
Potassium hydroxide solution	--	Potassium hydroxide	
Rubber resin coatings	--	Acetone	
	--	Coal tar pitch	
	--	Ethyl acetate	
	--	Methyl ethyl ketone	
	--	Toluene	
	--	Xylene	
Emissions			
Gases	--	Formaldehyde	
	--		Nitrogen dioxide
	--		Ozone
	--		Sulfur dioxide
	--		Sulfur trioxide
Hydrocarbons	--	Benzene	
	--	Ethylbenzene	
	--	n-Hexane	
	--	PAHs	

Table E.1 (Continued)

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
	--	Toluene	
	--	m-Xylene	
	--	o-Xylene	
	--	p-Xylene	
Particulate matter	--	Barium	
	--	Cadmium	
	--	Copper	
	--	Fine mineral fibers	
	--	Lead	
	--	Manganese	
	--	Nickel	
Particulate matter (cont.)	--	POM	
	--	Zinc	
Miscellaneous Materials			
Acids	--	Acetic anhydride	
	--	Formic acid	
	--	Sodium chromate	
	--	Sulfuric acid	
Antifreeze, heat control,	--	Acrolein	
and dehydration agents	--	Cupric sulfate	
	--	Ethylene glycol	
	--	Freon	
	--	Phosphoric acid	
	--	Potassium hydroxide	
	--	Sodium hydroxide	
	--	Triethylene glycol	
Batteries	--	Cadmium	
	--	Cadmium oxide	
	--	Lead	
	--	Nickel hydroxide	
	--	Potassium hydroxide	
	--	Sulfuric acid	
Biocides	--	Formaldehyde	
	--	Isopropyl alcohol	
	--	Methanol	
Cleaners	--	Hydrochloric acid	
Corrosion inhibitors	--	4-4' methylene dianiline	

Table E.1 (Continued)

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
	--	Acetic acid	
	--	Ammonium bisulfite	
	--	Basic zinc carbonate	
	--	Diethylamine	
	--	Dodecylbenzenesulfonic acid	
	--	Ethylene glycol	
	--	Isobutyl alcohol	
	--	Isopropyl alcohol	
	--	Methanol	
	--	Napthalene	
	--	Sodium nitrite	
	--	Toluene	
	--	Xylene	
Emulsion breakers	--	Acetic acid	
	--	Acetone	
Emulsion breakers	--	Ammonium chloride	
(cont.)	--	Benzoic acid	
	--	Isopropyl alcohol	
	--	Methanol	
	--	Napthalene	
	--	Toluene	
	--	Xylene	
	--	Zinc chloride	
Fertilizers	--	Unk	
Herbicides	--	Unk	
Lead-free thread	--	Copper	
compound	--	Zinc	
Lubricants	--	1,2,4-trimethylbenzene	
	--	Barium	
	--	Cadmium	
	--	Copper	
	--	n-Hexane	
	--	Lead	
	--	Manganese	
	--	Nickel	
	--	PAHs	
	--	POM	

Table E.1 (Continued)

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
	--	Zinc	
Methanol	--	Methanol	
Motor oil	--	Zinc compounds	
Paints	--	Aluminum	
	--	Barium	
	--	n-Butyl alcohol	
	--	Cobalt	
	--	Lead	
	--	Manganese	
	--	PAHs	
	--	POM	
	--	Sulfuric acid	
	--	Toluene	
	--	Triethylamine	
	--	Xylene	
Paraffin control	--	Carbon disulfide	
	--	Ethylbenzene	
	--	Methanol	
	--	Toluene	
	--	Xylene	
Photoreceptors	--	Selenium	
Scale inhibitors	--	Acetic acid	
	--	Ethylene diamine tetra	
	--	Ethylene glycol	
	--	Formaldehyde	
	--	Hydrochloric acid	
	--	Isopropyl alcohol	
	--	Methanol	
	--	Nitrilotriacetic acid	
Sealants	--	1,1,1-trichloroethane	
	--	n-Hexane	
	--	PAHs	
	--	POM	
Solvents	--	1,1,1-trichloroethane	
	--	Acetone	
	--	t-Butyl alcohol	
	--	Carbontetrachloride	
	--	Isopropyl alcohol	

Table E.1 (Continued)

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
	--	Methyl ethyl ketone	
	--	Methanol	
	--	PAHs	
	--	POM	
	--	Toluene	
	--	Xylene	
Starting fluid	--	Ethyl ether	
Surfactants	--	Ethylene diamine	
	--	Isopropyl alcohol	
	--	Petroleum naphtha	

[1] PAH = polynuclear aromatic hydrocarbons
POM = polycyclic organic matter.

APPENDIX F:

PERMITTED WATER WELLS

Appendix F Permitted Water Wells

PermitNo	Priority	ArvStatus	Use	Loc	Tns	Rng	Sec	QtrQtr	ArvLot	Applicant	FacName	YldAct	WellDepth	StatDepth	Chem	WellLog	MwbzTop	MwbzBot
31/10/256W	26-Mar-01	UNA	CBM	X	23	80	7	SWSW		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 20							
P83080W	27-Jul-90	UNA	STO	X	23	80	17	NENW		BURT PALM	CHACE #1	5	140	60	No	Yes	125	Unk
P83081W	27-Jul-90	UNA	STO	X	23	80	17	NENW		BURT PALM	CHACE #2	5	160	105	No	Yes	145	Unk
P108935W	01-Oct-97	UNA	MIS	X	23	80	18	SESE		USDI, BLM** HI ALLEN RANCH	DIXIE DRAW WELL #1	15	150	15	No	No	Unk	Unk
P108933W	01-Oct-97	UNA	STO	X	23	80	20	NENW		USDI, BLM** HI ALLEN RANCH	MISSOURI JOHN WELL #1	15	170	12	No	No	Unk	Unk
P108934W	01-Oct-97	UNA	STO	X	23	80	20	NENW		USDI, BLM** HI ALLEN RANCH	MISSOURI JOHN WELL #2	10	80	12	No	No	Unk	Unk
P58518W	06-Apr-81		MON,MIS	X	23	80	30	SESE		ROSEBUD COAL SALES CO.	WW-9021-80	0	500	201.45	No	Yes	480	493.5
P107026W	06-Aug-97	UNA	STO	X	23	80	30	SWNE		WYO BOARD OF LAND COMMISSIONERS** HI ALLEN RANCH	MISSOURI JOHN SPRING	9	Flo	Flo	No	No	Unk	Unk
P84781W	26-Mar-91	CAN	MIS,DEW,CBM	X	23	81	1	NESW		MET FUEL INC.	UPRC 1-11							
P82173W	12-Mar-90	CAN	MIS,DEW,CBM	X	23	81	2	NESW		ANDERMAN-SMITH OPERATING	USA-PALM LIVESTOCK #2-1							
P82545W	12-Mar-90	CAN	MIS,DEW,CBM	X	23	81	2	SWSW		ANDERMAN-SMITH OPERATING	USA-PALM LIVESTOCK #2-2							
P82174W	12-Mar-90	A&C	MIS,DEW,CBM	X	23	81	3	NESE		MET FUEL INC.	UPRC-PALM LIVESTOCK #3-1	73	6015	300	Yes	Yes	3834	3874
P84784W	26-Mar-91	CAN	MIS,DEW,CBM	X	23	81	5	NENE		MET FUEL INC.	UPRC/HANSEN 5-1							
P52028W	30-Jan-80	CAN	RES,MIS	X	23	81	8	SWSE		ARCH MINERAL CORPORATION	S2 81							
P43960W	16-Jun-78	CAN	MIS	X	23	81	8	SWSE		ARCH MINERAL CORP.	S2-81							
P37153W	01-Nov-76		MON,MIS	X	23	81	9	NESW		ARCH MINERAL CORP.	S2W-5	Unk	200	18	No	Yes	Unk	Unk
P37152W	01-Nov-76		MON,MIS	X	23	81	9	NWSW		ARCH MINERAL CORP.	S2W-4	Unk	200	9	Yes	Yes	Unk	Unk
P37151W	01-Nov-76		MON,MIS	X	23	81	9	NWSW		ARCH MINERAL CORP.	S2W-3	0	300	42	Yes	Yes	Unk	Unk
P82175W	12-Mar-90	CAN	MIS,DEW,CBM	X	23	81	10	NENE		ANDERMAN-SMITH OPERATING	USA-PALM LIVESTOCK #10-1							
P59441W	26-Oct-81	CAN	MIS	X	23	81	10	SWSE		ARCH MINERAL CORP.**USDI, BLM	9853							
32/2/126W	22-Jun-01	UNA	CBM	X	23	81	11	NENE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT #37							
P84783W	26-Mar-91	CAN	MIS,DEW,CBM	X	23	81	11	NENE		MET FUEL INC.	UPRC/PALM LIVESTOCK 11-1-1							
P84947W	22-Apr-91	A&C	MIS,DEW,CBM	X	23	81	11	NENW		MET FUEL INC.	ENL UPRR-PALM LIVESTOCK #11-1	88	6012	300	Yes	Yes	4372	4433
32/3/126W	22-Jun-01	UNA	CBM	X	23	81	11	NENW		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT #39							
P82176W	12-Mar-90	A&C	MIS,DEW,CBM	X	23	81	11	NENW		MET FUEL INC.	UPRC-PALM LIVESTOCK #11-1	22	6012	300	Yes	Yes	4372	4433
31/3/257W	26-Mar-01	UNA	CBM	X	23	81	11	NESE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 27							
P84782W	26-Mar-91	CAN	MIS,DEW,CBM	X	23	81	11	NESE		MET FUEL INC.	UPRC/PALM LIVESTOCK 11-9							
P85270W	22-May-91	CAN	MIS,DEW,CBM	X	23	81	11	NESW		MET FUEL INC.	UPRC/PALM LIVESTOCK 11-11							
P90861W	23-Feb-93	A&C	MIS,DEW,CBM	X	23	81	11	NWNE		METFUEL WYOMING, INC.	UPRR-PALM LIVESTOCK #11-2P	88	4700	125	Yes	Yes	4478	4531
P90863W	23-Feb-93	A&C	MIS,DEW,CBM	X	23	81	11	SENW		METFUEL WYOMING, INC.	UPRR-PALM LIVESTOCK #11-4P	73	4450	240	Yes	Yes	4212	4272
31/5/257W	26-Mar-01	UNA	CBM	X	23	81	11	SESW		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 29							
32/8/125W	22-Jun-01	UNA	CBM	X	23	81	11	SWNE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT #36							
P90862W	23-Feb-93	A&C	MIS,DEW,CBM	X	23	81	11	SWNE		METFUEL WYOMING, INC.	UPRR-PALM LIVESTOCK #11-3P	90	4575	210	Yes	Yes	4363	4521
P90864W	23-Feb-93	A&C	MIS,DEW,CBM	X	23	81	11	SWNE		METFUEL WYOMING, INC.	UPRR-PALM LIVESTOCK #11-5P	82	4575	150	Yes	Yes	4364	4424
P85269W	22-May-91	CAN	MIS,DEW,CBM	X	23	81	11	SWNE		MET FUEL INC.	UPRC/PALM LIVESTOCK 11-7							
31/4/257W	26-Mar-01	UNA	CBM	X	23	81	11	SWSE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 28							
32/9/125W	22-Jun-01	UNA	CBM	X	23	81	11	SWSW		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT #30							
32/7/125W	22-Jun-01	UNA	CBM	X	23	81	12	NENW		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT #87							
31/3/258W	26-Mar-01	UNA	CBM	X	23	81	12	NESW		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 25							
32/10/125W	22-Jun-01	UNA	CBM	X	23	81	12	SWNE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT #88							
32/1/126W	22-Jun-01	UNA	CBM	X	23	81	12	SWNW		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT #86							
31/2/258W	26-Mar-01	UNA	CBM	X	23	81	12	SWSE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 24							
31/4/258W	26-Mar-01	UNA	CBM	X	23	81	12	SWSW		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 26							
31/1/257W	26-Mar-01	UNA	CBM	X	23	81	13	NENE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 21							
P130596W	08-Sep-00	UNA	STO,CBM	X	23	81	13	NENW		BARRETT RESOURCES CORPORATION	HANNA DRAW UNIT #18	2.92	4260	300	Yes	Yes	4060	4125

Appendix F Permitted Water Wells

PermitNo	Priority	ArvStatus	Use	Loc	Tns	Rng	Sec	QtrQtr	ArvLot	Applicant	FacName	YldAct	WellDepth	StatDepth	Chem	WellLog	MwbzTop	MwbzBot
P128229W	21-Aug-00	UNA	CBM	X	23	81	13	NESW		BARRETT RESOURCES CORP	HANNA DRAW UNIT #10	2.3	3720	300	Yes	Yes	3485	3530
P128419W	21-Aug-00	UNA	CBM	X	23	81	13	NWNW		BARRETT RESOURCES CORP	HANNA DRAW UNIT #16-13	4.4	4090	201	Yes	Yes	3895	3965
P128227W	21-Aug-00	UNA	CBM	X	23	81	13	NWSW		BARRETT RESOURCES CORP	HANNA DRAW UNIT #9	11.7	3576	400	Yes	Yes	3385	3425
P130597W	08-Sep-00	UNA	STO,CBM	X	23	81	13	SENW		BARRETT RESOURCES CORPORATION	HANNA DRAW UNIT #19	7.9	3905	300	Yes	Yes	3695	3760
P128226W	21-Aug-00	UNA	CBM	X	23	81	13	SESW		BARRETT RESOURCES CORP	HANNA DRAW UNIT #11							
31/2/257W	26-Mar-01	UNA	CBM	X	23	81	13	SWNE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 22							
P119325W	27-Sep-99	UNA	STO,CBM	X	23	81	13	SWSW		BARRETT RESOURCES CORP.	Hanna Draw Unit 31							
31/5/258W	26-Mar-01	UNA	CBM	X	23	81	14	NENE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 31							
31/7/258W	26-Mar-01	UNA	CBM	X	23	81	14	NENW		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 33							
P59440W	26-Oct-81	CAN	MIS	X	23	81	14	NESE		ARCH MINERAL CORP.**USDI, BLM	9852							
P128228W	21-Aug-00	UNA	CBM	X	23	81	14	SESE		BARRETT RESOURCES CORP	HANNA DRAW UNIT #5							
31/6/258W	26-Mar-01	UNA	CBM	X	23	81	14	SWNE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 32							
P55288W	06-Jan-81		MON,MIS	X	23	81	22	NESW		ROSEBUD COAL SALES COMPANY	WW9019	0	235	98.9	No	Yes	Unk	Unk
P55289W	06-Jan-81		MON,MIS	X	23	81	22	NESW		ROSEBUD COAL SALES COMPANY	WW9018	0	240	105.1	No	Yes	Unk	Unk
P62558W	18-Nov-82		MON,MIS	X	23	81	22	SENW		ROSEBUD COAL SALES CO.	R-9018A	0	221	192	No	Yes	167	216
P94261W	16-Dec-93	UNA	MIS,MON	X	23	81	22	SESE		CYPRUS SHOSHONE COAL CORP.	TS-1	0	104	81.1	No	Yes	80	95
P55291W	06-Jan-81		MON,MIS	X	23	81	22	SESE		ROSEBUD COAL SALES COMPANY	WW9016	0	300	62	No	Yes	260.5	267
P94258W	16-Dec-93	UNA	MIS,MON	X	23	81	22	SESE		CYPRUS SHOSHONE COAL CORP.	TG-3	0	46	27.1	No	Yes	15	46
P55290W	06-Jan-81		MON,MIS	X	23	81	22	SESE		ROSEBUD COAL SALES COMPANY	WW9017	0	280	61.2	No	Yes	Unk	Unk
P66273W	22-Dec-83	CAN	MIS	X	23	81	22	SWSE		ROSEBUD COAL SALES COMPANY**USDI, BLM	OPEN PIT #10							
P128230W	21-Aug-00	UNA	CBM	X	23	81	23	NENE		BARRETT RESOURCES CORP	HANNA DRAW UNIT #12							
P107332W	29-Aug-97	UNA	MON,MIS	X	23	81	23	NWSW		CYPRUS COAL CORP.	BS-2-80	0	1419	10	No	Yes	1407	1423
P107331W	29-Aug-97	UNA	MON,MIS	X	23	81	23	NWSW		CYPRUS COAL CORP.	BS-2-SS	0	1137.2	187	No	Yes	1072	1149
P107333W	29-Aug-97	UNA	MON,MIS	X	23	81	23	NWSW		CYPRUS COAL CORP.	BS-2-U1	0	1524.7	279	No	Yes	1496	1530
P106061W	23-May-97	UNA	MON,MIS	X	23	81	23	SENE		CYPRUS COAL CORP.	BS-1-SS	0	1927	257	No	Yes	1778	1948
P106063W	23-May-97	UNA	MON,MIS	X	23	81	23	SENE		CYPRUS COAL CORP.	BS-1-80	0	2209	287	No	Yes	2195	2216
P106064W	23-May-97	UNA	MON,MIS	X	23	81	23	SENE		CYPRUS COAL CORP.	BS-1-80B	0	2252	280	No	Yes	2236	2249
P106062W	23-May-97	UNA	MON,MIS	X	23	81	23	SENE		CYPRUS COAL CORP.	BS-1-U1	0	2298	300	No	Yes	2261	2296
P94257W	16-Dec-93	UNA	MIS,MON	X	23	81	23	SWSW		CYPRUS SHOSHONE COAL CORP.	TG-2	0	43	24.5	No	Yes	25	43
P128231W	21-Aug-00	UNA	CBM	X	23	81	24	NWNW		BARRETT RESOURCES CORP	HANNA DRAW UNIT #7							
P94259W	16-Dec-93	UNA	MIS,MON	X	23	81	26	SWNW		CYPRUS SHOSHONE COAL CORP.	BR-1	0	137	114	No	Yes	115	137
P94260W	16-Dec-93	UNA	MIS,MON	X	23	81	26	SWNW		CYPRUS SHOSHONE COAL CORP.	BR-2	0	71	62.5	No	Yes	45	65
P97151W	14-Sep-94	UNA	MON,MIS	X	23	81	26	SWSW		CYPRUS SHOSHONE COAL CORP.	P-5A	0	706	615	No	Yes	661	706
P11207W	01-Dec-71		STO	X	24	81	26	SESE		ROBERT J. KORKOW	KORKOW #2	10	800	Unk	No	No	Unk	Unk
P37149W	01-Nov-76		MON,MIS	X	24	81	33	SWNE		ARCH MINERAL CORP.	S2W-1	Unk	200	73	Yes	No	Unk	Unk
31/1/258W	26-Mar-01	UNA	CBM	X	24	81	33	SWSE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 46							
P3817W	18-Dec-69		STO	X	24	81	34	NWNE		ROBERT J. KORKOW	KORKOW #1	8	800	300		No		
P17385W	27-Dec-72		STO	X	24	81	34	NWNE		U.S.A./BUREAU OF LAND MANAGEMENT	MEDICINE BOW (INDEX #4266)	8	800	340	No	No	Unk	Unk
P37150W	01-Nov-76		MON,MIS	X	24	81	35	NESE		ARCH MINERAL CORP.	S2W-2	Unk	300	190	Yes	Yes	Unk	Unk
31/10/257W	26-Mar-01	UNA	CBM	X	24	81	35	NWNE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 43							
31/8/257W	26-Mar-01	UNA	CBM	X	24	81	35	NWSE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 44							
31/9/257W	26-Mar-01	UNA	CBM	X	24	81	35	SENE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 45							
31/7/257W	26-Mar-01	UNA	CBM	X	24	81	35	SESE		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 42							
31/6/257W	26-Mar-01	UNA	CBM	X	24	81	35	SESW		BARRETT RESOURCES CORPORTATION	HANNA DRAW UNIT # 41							
P128418W	21-Aug-00	UNA	CBM	X	24	81	35	SWNW		BARRETT RESOURCES CORP	HANNA DRAW UNIT #14-35	1.5	4648	350	Yes	Yes	4235	4305